FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

Vol. 80 Thursday, December 5, 1946 No. 1581

49, Wellington Street, London, W.C.2
'Grams : " Zacatecas, Rand, London "
'Phone : Temple Bar 3951 (Private Branch Exchange)
PUBLISHED WEEKLY : 21s. per annum (Home and Overseas)

In Search of a Silver Lining

We spent one morning last week attending the conference on export, organised by the Federation of British Industries. The opening speech by Sir Clive Baillieu drew attention to current conditions as related to export, and suggested that risks might be taken to fill the shops in order to provide incentives for added effort on the part of employees. He posed the sensible notion of applying to each problem the answer to the question—" Will this solution promote production and employment? " The main theme of his speech was the creation of an atmosphere throughout the country for the achievement of increased production. Sir Stafford Cripps, President of the Board of Trade, gave a very candid account of the Government's policy in respect to imports. For foundry owners the outstanding points were: (1) Exports would, wherever possible, be canalised to the " hard " currency markets, that is, generally speaking, the Western hemisphere; (2) exports would be selected so as to sell those goods which contained a minimum amount of raw material and a maximum of labour, or commanded a market because of design; (3) permits would readily be granted for the importation of such items as castings, where, by building into machines, an exportable product would be made; (4) that unless we could reach the target figure of 75 per cent. increase in exports before the American and Canadian loans were exhausted this country " would come a cropper," and (5) (and this was the only bright spot in a particularly gloomy conference) he (the President of the Board of Trade) had great hopes of a successful issue arising out of the International Trade Conference. " Early negotiations had made a good beginning."

The next speech was by Mr. Leslie Gamage, the chairman of the conference. He, using a few cardinal statistics, stressed the almost overwhelming difficulties besetting the exporter, not only for the immediate future, but also on a long-term policy. He seemed to think that the tourist traffic was worth developing, but much had to be done before a proper reception could be given to overseas guests in the way of restocking the shops and rehabilitating the hotels. He confirmed the notion we recently expounded that the large manufacturers with overseas offices should merchant the goods of firms, the structure of which is inadequate to undertake representation in distant markets. Mr. Gamage was of opinion that the present shortages of steel and castings were " vitally damaging to our future prospects." He painted what he designated a " grim picture," but it was positively rosy compared with that of Viscount Bennett. The former Prime Minister of Canada, who to our mind ranks high amongst British orators, told the conference quite bluntly that unless the United Kingdom could sell goods of the type desired by the people of the Dominions, of a quality and at a price unattainable by the manufacturers of those countries, then no orders would be placed. Instead we could expect an ever-increasing competition from them in the markets of the world. In the past, the United Kingdom had enjoyed a 25 or 33⅓ per cent. preferential tariff, because it had presented, *gratis*, all the natural resources of those countries, resources from which the present-day inhabitants were benefiting. The passage of time, however, would make the peoples of the Empire forget. Pressure on our time prevented us from attending other sessions, which we sincerely hoped would do something to dispel the gloom permeating the opening gathering.

Contents

In Search of a Silver Lining, 337.—Forthcoming Events, 338.—Iron and Steel Institute, 338.—B.I.O.S. Information centre, 338.—Experiments with a Foundry Test for the Fluidity of Molten Steel, 339.—Publications Received, 343.—Notes from the Branches, 344.—Book Review, 344.—Dies for Drop Stamps, 345.—Carbon in Cupola Metal, 346.—Logarithms, Sines and Cosines for Making and Checking Patterns, 347.—House Organs, 348.—New Catalogues, 348.—Vitreous Enamelling Section : Institute of Vitreous Enamellers, 349.—The Influence of Cobalt and Nickel in Vitreous Enamel Ground-coats, 351.—Works Management and Profits, 352.—Swedish Sponge-iron Powder, 352.—Imports and Exports of Iron and Steel, 353.—News in Brief, 354.—Obituary.

FORTHCOMING EVENTS

(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)

DECEMBER 6.

Institution of Mechanical Engineers :—"Free-piston Compressor Engines," by H. O. Farmer. At the Institution, Storey's Gate, London, S.W.1, at 5.30 p.m.

Keighley Association of Engineers :—"The Steam Locomotive," by Dr. A. W. Tuplin. At Devonshire Buildings, Devonshire Street, Keighley, at 7.30 p.m.

Manchester Association of Engineers :—"Developments in Ship Propulsion," by S. B. Freeman. At the Engineers' Club, 17, Albert Square, Manchester, at 6.45 p.m.

Royal Statistical Society (Industrial Applications section) :—"Statistics in America—Factory Organisation," by W. Bennett. At the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London, W.C.2, at 6 p.m.

DECEMBER 7.

Newport and District Metallurgical Society :—"Furnace Efficiency," by Dr R. J. Sarjant. At the Newport Technical College, at 6.30 p.m.

DECEMBER 9.

Association of Bronze and Brass Founders (Yorkshire area) :—Informal meeting. At the Great Northern Hotel, Leeds, at 12.45 p.m.

DECEMBER 12.

Institute of Metals :—Joint meeting with the London branch of the I.B.F. "Centrifugal Casting," by Dr. L. Northcott. At the Institute, 4, Grosvenor Gardens, London, S.W.1, at 7 p.m.

Institute of Welding (Sheffield and District branch) :—"Developments in the Technique and Use of Resistance Welding," by R. W. Ayres. At the Royal Victoria Station Hotel, Sheffield, at 6.30 p.m.

Institution of Mechanical Engineers (Graduates' section) :—"Mechanical Principles of the Screw Extrusion Machine," by Z. M. Rogowsky. At the Institution, Storey's Gate, London, S.W.1, at 6.30 p.m.

Institute of British Foundrymen

DECEMBER 7.

Lancashire branch :—"The Production of High Quality Steel," by W. H. Salmon. At the College of Technology, Sackville Street, Manchester, at 3 p.m.

Wales and Monmouth branch :—"Steel Castings," by Hardy and Sanders. At the Engineers' Institute, Cardiff, at 6.30 p.m

DECEMBER 9.

Sheffield branch :—"German Steelfoundries," by J. E. Mercer. At the Royal Victoria Station Hotel, Sheffield, at 7.30 p.m.

DECEMBER 10.

Slough section :—"Cast Irons for Special Duties," by Dr. A. B. Everest. At the Lecture Theatre, High Duty Alloys, Limited, Trading Estate, Slough, at 7 p.m.

DECEMBER 12.

East Anglian section :—"Grand Slam Bomb," by B. Gray. At the Lecture Hall, Central Library, Ipswich, at 7 p.m.

Lincoln section :—Joint meeting with the Lincoln Engineering Society. "Modern Foundry Equipment," by G. E. France. At the Technical College, Lincoln, at 7.15 p.m.

London branch :—Joint meeting with the Institute of Metals. "Centrifugal Casting," by Dr. L. Northcott. At the Institute, 4, Grosvenor Gardens, London, S.W.1, at 7 p.m.

DECEMBER 13.

Middlesborough branch :—"German Steelfoundries," by J. E. Mercer. At the Cleveland Technical and Scientific Institute, Middlesborough, at 7.30 p.m.

(Continued at foot of next column.)

IRON AND STEEL INSTITUTE

ENGINEERS' GROUP

The programme for the second meeting of the Iron and Steel Engineers' Group, which will be held at 4, Grosvenor Gardens, London, S.W.1, December 11, has had to be altered. Mr. C. A. Phipps (Guest, Keen & Nettlefolds, Limited) will be unable, owing to ill-health, to read a Paper on "Roll-neck Bearings" in the afternoon session; arrangements have therefore been made to hold an open discussion on the subject. The revised programme is as follows:—

From 10.30 a.m. to 12.45 p.m.—Reading and discussion of a Paper on "Lubrication in Iron and Steelworks Engineering," by Mr. H. J. Knight (Shell-Mex & B.P., Limited), who has recently returned from an extended tour in America. The Paper, which will be read in full, will cover the main subjects of lubrication for blast furnaces; gas regulators; lubrication of main electrical equipment; gear and pinion lubrication; back-up roll-neck lubrication; fabric bearings; and rolling oils.

The buffet luncheon will be held from 12.45 to 2.15 p.m., followed at 2.15 p.m. by a discussion on "Roll-neck Bearings." The discussion will be opened by four speakers, who will each speak for about 15 minutes on a particular type of bearing. The speakers are Mr. J. M. Borland (Colvilles, Limited), Mr. L. R. Pearson (Richard Thomas & Baldwins, Limited), Mr. F. W. Jones (Guest Keen Baldwins Iron & Steel Company, Limited), and Mr. G. R. Walshaw (Appleby-Frodingham Steel Company, Limited). Their respective subjects will be, white metal bearings, roller bearings, synthetic resin bearings, and oil film bearings.

Members of the Group who wish to attend the meeting, and have not notified the secretary, are asked to do so as soon as possible.

B.I.O.S. IMFORMATION SECTION

The British Intelligence Objectives Sub-committee Information Section, with offices at 37, Bryanston Square, London, W.1, is prepared to help firms in connection with the acquisition of reports and information resulting from visits to Germany by groups of technicians. As this service cannot last indefinitely, there is some urgency in the stating of requirements. To illustrate how information is dealt with, a series of exhibitions is to be held in London and the provinces, starting with one at Imperial Chemical House, Millbank, S.W.1, from December 10 to 19.

(Continued from previous column.)

DECEMBER 14.

Bristol and West of England branch :—"Loam Moulding," by R. D. Lawrie. At the Grand Hotel, Broad Street, Bristol, at 3 p.m.

East Midlands branch :—"Foundry Problems," submitted by members. At the Technical College, Derby, at 6 p.m.

Scottish branch :—"American and German Steelfoundry Practice," by B. Gray. At the Royal Technical College, Glasgow, at 3 p.m.

West Riding of Yorkshire branch :—Brains trust. At the Technical College, Bradford, at 6.30 p.m.

EXPERIMENTS WITH A FOUNDRY TEST FOR THE FLUIDITY OF MOLTEN STEEL*

By L. W. SANDERS and C. H. KAIN

For many years the Authors have held the view that at the same temperature there is relatively little difference in fluidity between converter and basic electric steel. Data published in 1938 (J.I.S.I., 1938, No. 11) showed that in the foundry with which the Authors are associated, converter steel was consistently 20 to 30 deg. C. hotter than electric steel when poured under the same ladle conditions. It was also shown that the rate of loss of temperature on both types of steel was the same, which appeared to disprove the suggestion that converter steel had better *life* owing to exothermic reactions proceeding in the metal.

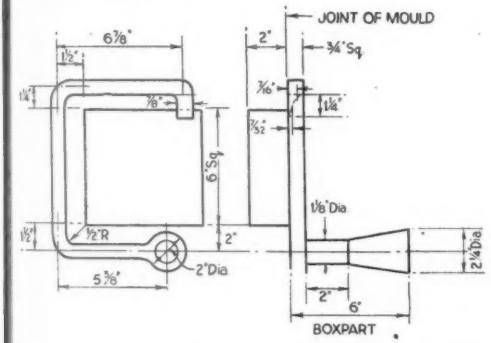


FIG. 1.—STEEL FLUIDITY TEST. (ORIGINAL DESIGN.)

About this time, the Ruff fluidity test was being used on the electric furnace stage as a control test and met with a fair degree of success, but in the long term it was not found possible to produce completely accurate correlation between the pouring properties of the steel in the foundry and the fluidity as shown by the Ruff test on the furnace stage. At this time all temperature readings were taken with optical pyrometers.

Objections to Existing Tests

The two forms of fluidity test in most common use are the various forms of the spiral and the Ruff test. Both these test-pieces are small and primarily suitable for laboratory work. Owing to their smallness, they are difficult to pour under conditions of commercial steel production. The ratio of mould surface to mass is much higher than may be expected in the production of castings, and it is felt that the effect of mould conditions, etc., is greatly magnified. In the foundry, the test is suitable for use on the furnace stage, and it is considered that, owing to the difficulty of obtaining uniform ladle conditions under which the steel is taken from the furnace to the mould, a stage test is not a reliable guide to the pouring properties of the steel.

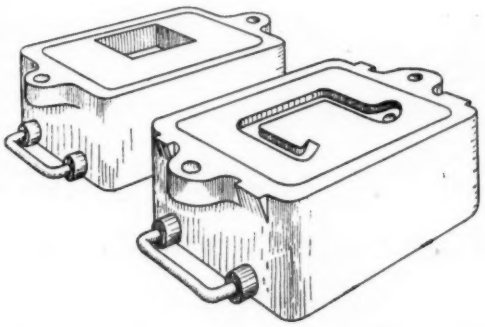


FIG. 2.—MOULDS MADE IN 8-IN. DEEP BOX PARTS ON A JOLT-RAM STRAIGHT-DRAW MACHINE.

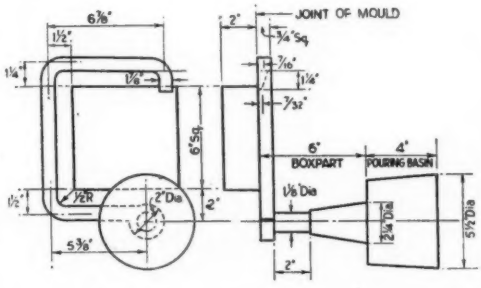


FIG. 3.—STEEL FLUIDITY TEST. (MODIFIED DESIGN.)

*A Paper read before the inaugural technical meeting of the British Steel Founders' Association, Mr. A. B. Lloyd presiding.

Fluidity of Molten Steel

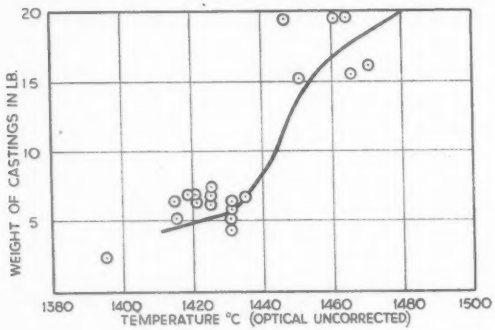


FIG. 4.—TROPENAS CONVERTER STEEL.

Requirements for Test-piece

It was decided to design a test-piece for fluidity which could be used on the foundry floor with steel taken from the ladle. The obvious drawback to this is that, once steel is in the ladle, it cannot be altered if it is found to be unsuitable. On the other hand, such a test would give a reliable guide as to the suitability of the steel for light sections or castings difficult to run.

The following conditions were laid down:—(1) The test mould must be capable of measuring fluidity within small variations; (2) results from the test should be reproducible; (3) the mould must be simple, convenient to prepare and capable of being used in the foundry without elaborate levelling, etc., equipment; (4) it must be possible to pour the mould under the normal pouring conditions of the foundry, and (5) the mould should, if possible, reproduce the conditions inside the ordinary moulds of the foundry.

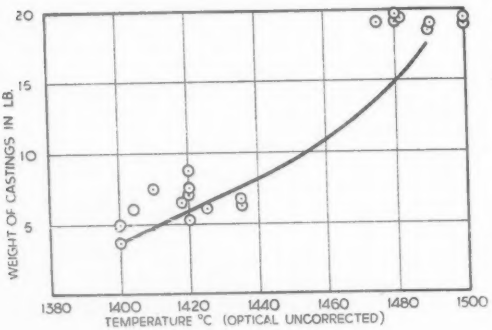


FIG. 5.—BASIC ELECTRIC STEEL.

Description of Test-piece

After consideration, the Authors decided to adopt a simple test-piece which consists essentially of a mould cavity into which the steel is poured through a restricted ingate. The weight of steel entering the mould to be used as a measure of fluidity. In order to reproduce normal mould conditions as closely as possible, the runner channel between the downgate and the ingate was made as long as possible and given three changes of direction. Fig. 1 shows the original design of the test-piece.

A pattern suitable for machine moulding was made and moulds (see Fig. 2) made in 8-in. deep box parts

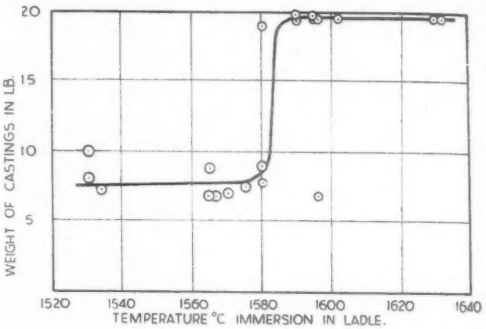


FIG. 6.—TROPENAS CONVERTER STEEL FLUIDITY.

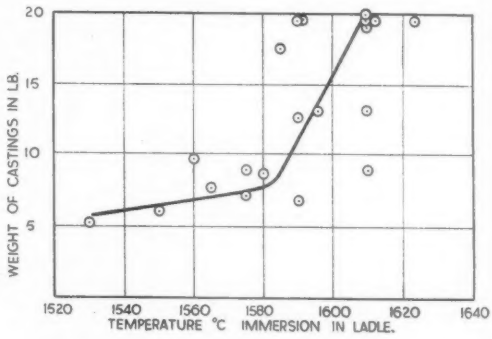


FIG. 7.—BASIC ELECTRIC STEEL FLUIDITY.

on a jolt-ram straight-draw machine. All the moulds were green sand, and all the experiments were carried out in green sand. Facing sand was used on the pattern, runners, etc., and backing sand for filling purposes. The sand properties were as follows:—

	Moisture.	Green Bond.	Permeability.
	Per cent.	Lb. per sq. in.	
(1) Facing	3.5	8.25	300
(2) Backing..	3.5	3.50	210

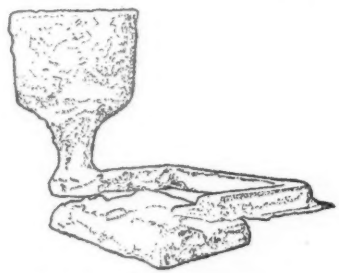


FIG. 8.—A TEST-PIECE CASTING.

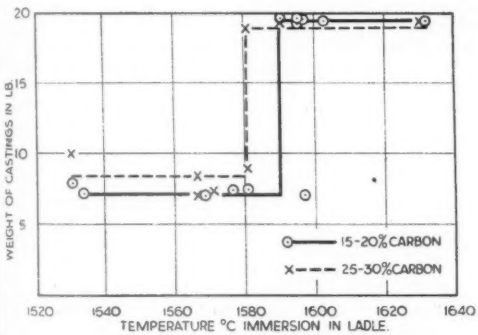


FIG. 9.—SHOWS THE 20 CONVERTER STEEL HEATS ANALYSED.

Preliminary Tests

In order to ascertain if consistent results could be obtained from consecutively poured moulds, batches of five moulds were made and poured consecutively from the same ladle. A typical example of the results obtained recorded metal weights of 13¼, 8¼, 6, 11, and 12½ lb. Observation showed that the variation was due to pouring conditions which, with the ordinary funnel-shaped downgate, were entirely at the mercy of the ladleman.

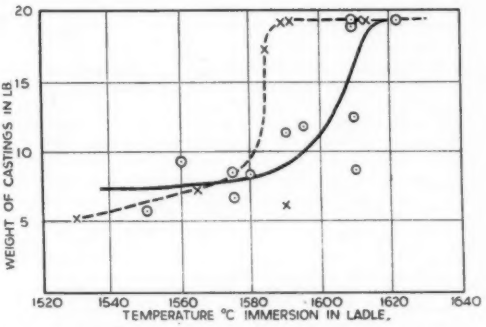


FIG. 10.—SHOWS THE 20 BASIC ELECTRIC STEEL HEATS ANALYSED.

To overcome this variable, it was decided to provide a pouring basin of adequate dimensions into which the ladle nozzle could be opened full bore and closed as soon as the pouring basin was full. The modified design is shown in Fig. 3. The pouring basin was formed on the top of the mould by an oil-sand core. This modification increased the total weight of the test-piece from 26 to 55 lb., but it was found that this entirely eliminated variables due to the idiosyncracies of the ladleman.

Typical results taken from a number of series of consecutively poured moulds gave 7¼, 7½, 7¾, 7½, and 7¼ lb. It was considered that these results were sufficiently consistent to justify large-scale trials.

Record of Tests

The Authors believe that much published work is greatly reduced in value and reliability by the paucity

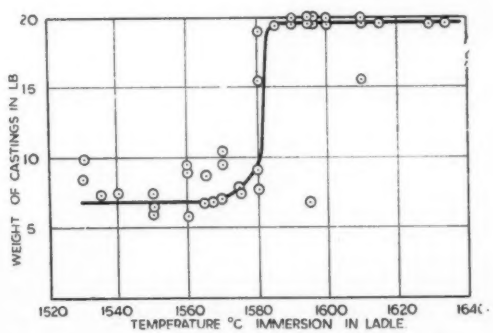


FIG. 11.—A FURTHER 20 HEATS OF CONVERTER STEEL ADDED.

Fluidity of Molten Steel

of the number of results quoted. Therefore, in order to obtain an indication of the general behaviour of the new test-piece in the foundry, it was decided to pour a test-piece on every heat of carbon steel made within the usual range of 0.15 to 0.35 per cent. C.

The pouring practice was carefully standardised, the test-pieces being poured half-way through each cast. The test mould was placed in the centre of a row of normal production moulds so that continuity of ladle pouring was ensured. When over the mould, the nozzle was opened to the fullest extent until the runner basin flooded and was then closed.

A number of tests were made to see if the height of the ladle had any effect, but no appreciable difference in weight was found over a wide range of heights. In spite of this, it was decided to standardise ladle heights and a simple gauge stick was used to ensure a constant height of the nozzle above the mould.

Fig. 4 shows the temperature and weights of the first 20 heats of converter steel recorded, and Fig. 5, the first 20 heats of basic electric steel recorded. Both of these show a marked change in fluidity in the middle of the temperature range. These results were obtained with a Foster disappearing filament pyrometer, the readings being taken on the metal stream as it entered the mould.

About this time the immersion pyrometer equipment became available and it was decided to discard the results obtained with the optical pyrometer and to proceed entirely on the basis of immersion temperature readings. The couple used was frequently calibrated against the melting point of silver and readings are considered to be accurate with $\pm$ 5 deg. C. No difficulty was found in obtaining readings in the basic electric steel as the slag offered no resistance to the couple, but with converter steel, difficulty was sometimes experienced in penetrating the hard acid slag.

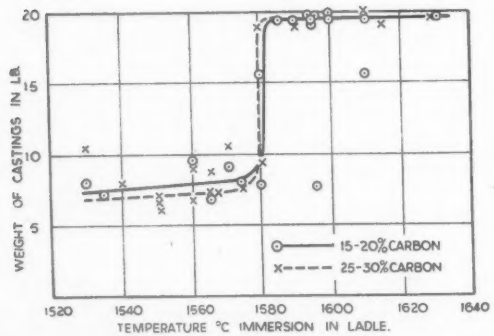


FIG. 12.—THE 40 HEATS OF CONVERTER STEEL ANALYSED INTO CARBON RANGES.

Fig. 6 shows the result obtained on 20 converter steel heats, and Fig. 7, 20 basic electric steel heats. The change in fluidity previously noted is again very prominent and the critical temperature appears to be about 1,580 to 1,590 deg. C.

Fig. 8 shows one of the test-piece castings. Fig. 9 shows the 20 converter steel heats analysed into two carbon ranges of 0.15 to 0.20 per cent. C, and 0.25 to 0.30 per cent. C. Fig. 10 shows the 20 basic electric steel heats analysed in the same manner. Fig. 11 shows a further 20 heats of converter steel added (40 in all).

Fig. 12 shows the 40 heats of converter steel analysed into two carbon ranges, and Fig. 13 shows a further 20 basic electric steel heats added, making a total of 40.

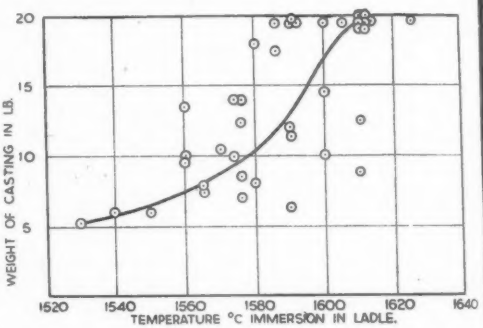


FIG. 13.—SHOWS A FURTHER 20 BASIC ELECTRIC STEEL HEATS ADDED.

Fig. 14 shows the 40 heats of basic electric steel analysed into carbon ranges.

Conclusions

(1) Tests are described on a practical test-piece suitable for use in the foundry. The results indicate that consistently reproducible results may be obtained within narrow limits.

(2) The results indicate that temperature rather than steel-making is the deciding factor in fluidity. There appears to be a marked increase of fluidity at temperatures over 1,580 deg. C. This change point being more pronounced in converter than in basic electric steel.

(3) In basic steel a number of heats of low fluidity occur in the higher temperature ranges but very few corresponding heats of high fluidity in the lower temperature ranges have been recorded. In converter steel only two heats of low fluidity occur in the higher temperature range.

(4) Analysis of the results show that in the two carbon ranges

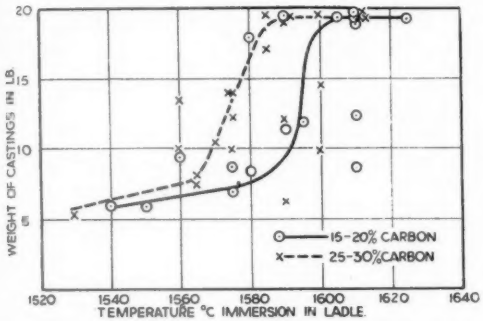


FIG. 14.—SHOWS THE 40 HEATS OF BASIC ELECTRIC STEEL ANALYSED INTO CARBON RANGES.

Fluidity of Molten Steel

(*a*) 0.15 to 0.20 per cent. C.
(*b*) 0.25 to 0.30 per cent. C.

there is no great difference in fluidity.

(5) It would be interesting to produce converter steel in a deliberately over-blown condition to see how this condition compares with the alleged over-reduced condition in basic electric steel.

(6) It may be argued that the results merely indicate that the correct temperature at which to pour the casting of the design used for test purposes is 1,580 deg. C. Further tests on various ingate sizes and ingates, bargate and downgate ratios would be interesting.

Although this note is presented on behalf of the Midland & South Wales Regions technical committee, the opinions are those of the Authors', and are not necessarily endorsed by the committee.

PUBLICATIONS RECEIVED

British Foundry Plant and Supplies. Published by the Foundry Trades' Equipment and Supplies Association, and the Foundry Equipment Export Group, from 94-98, Petty France, London, S.W.1.

This booklet has been prepared for the use of overseas foundrymen and is not available for home readers. It is divided into two main sections. Part I tells overseas buyers something of the effort made by the foundry industry and by each section thereof. Details are given as to the structure of the industry, its research and technical activities, and a short history of the "Equipment" association. Part II details in tabular form the British sources of foundry equipment and supplies, restricting the information given to members of the Association and the advertisers. The last section—some 60 odd pages—contains displayed advertisements—a good proportion in colour—of many of the best known supply and equipment houses in the country. Though several thousand copies of the booklet have been sent abroad, should any of our overseas readers have failed to receive a copy, a letter addressed to the Editor of the JOURNAL will ensure a copy being sent so long as the edition lasts.

Atlas of Defects in Castings. (Series I.) Prepared by Sub-committee T.S.9 of the Technical Council of the Institute of British Foundrymen, and published from the Institute's offices at St. John Street Chambers, Deansgate, Manchester, 3.

The primary object of this publication is to aid clarity of expression, when reference is being made to imperfections arising in components made as castings. It is essentially a guide for the man in the shop, whilst for those engaged in the translation of British articles into foreign languages covering certain aspects of foundry practice, it should be invaluable. The book has been prepared in loose-leaf form, so that, should there be any further common inherent imperfections in castings, they can be included. The members of the Institute are asked to help by furnishing further photographs, but in doing so they should remember that "common" and not "freak" imperfections are those sought. It is to be hoped that buyers of castings will not abuse the information disclosed, as they can rest assured that most of the imperfections shown would cause the castings to be scrapped before leaving the foundry.

Metallurgy—A Scientific Career in Industry. Published by the Joint Committee on Metallurgical Education, 4, Grosvenor Gardens, London, S.W.1.

This 36-page booklet is certainly well produced, but the reviewer would suggest that it would make a better appeal if it carried some illustrations. Moreover, he does not believe that a schoolboy can realise the difference between £600 and £1,000 a year. To him it is merely "a lot of money." The booklet is divided into six sections, the first four of which are ideal for the purpose; they cover the metallurgist's field; the industries served; research, and education and qualifications. As for the fifth chapter—"opportunities"—the reviewer suggests that it is both tiresome to read and serves no useful purpose. Modern youth is not interested in money as some would believe. The diagram and map are both useful as a visual appeal to youth.

Data Sheets Covering L.A.C. 10 and D.T.D. 428. Published by Alar, Limited, 35, New Broad Street, London, E.C.2.

These sheets detail the chemical composition; mechanical properties; strength at elevated temperatures; physical properties, machinability; casting characteristics, heat-treatment and applications. They are available to our readers upon writing to the above address.

NOTES FROM THE BRANCHES

NEWCASTLE-UPON-TYNE.—The second meeting of the session was held in the Neville Hall, on November 9, with the president, Mr. G. Elston, in the chair. He introduced Mr. J. L. Francis, a member of the Birmingham branch, who read his Paper on "Some Casting Troubles" (published in the FOUNDRY TRADE JOURNAL, May 30, 1946).

The presentation of the Paper, to which added interest was given by lantern slides illustrating the Author's points, was closely followed, as was evidenced when the branch president announced that the meeting was open for discussion.

MR. F. GREAVES raised the question whether green sand was suitable for moulds for pressure casting. He also commented on plaster of paris used for runner bushes: Was there any moisture content in this which might account for the blowholes shown in the alloy casting illustrated? Also was there any pick-up of iron from steel wool being inserted at the bottom of the runner?

MR. FRANCIS, in reply, said that he considered: (1) that green sand was certainly not suitable in moulds for pressure casting; (2) that there was no moisture in the plaster of paris used for runner bushes, as the material was thoroughly baked up to 1,000 deg. F.—it got almost red hot in the stove; (3) steel wool in the runners was only used in magnesium alloy castings where the temperature was relatively low. There would be no chance of iron pick-up, nor would subsequent casts be affected even if the heads of the runners were put back into the melt.

Segregation

Answering Mr. Tottle on the question of segregation, a common defect in high conductivity copper, deoxidation was one method of solving the difficulty. If the hydrogen was kept out, one could reoxidise later provided the adjustment was done sufficiently slowly and not with a large volume of oxide. In tin-bronze, phosphor-bronze and chill rolls, inverse segregation occurred. There was more than one theory of the cause. One was that it arose from the presence of a gas when it was out of solution which acted on the low melting point constituents and drew them through the casting shown on the screen, coupled with the die pressure due to shrinkage at the same time—it was associated with gas and excessive temperatures.

Answering Mr. Hudson and Mr. Elston and other members in regard to the table of shrinkages screened and particularly about cast iron and manganese-bronze being shown adjacent to each other, he said the volume shrinkage of the manganese-bronze was of a concentrated rather than a dispersed nature.

To Mr. Elston's query about tin sweat, he considered that temperature had an effect. The amount of sodium required for 100 lb. of molten alloy was 45 gms., equalling a 0.1 per cent. addition of sodium.

MR. ELSTON remarked that he had used silicon as a reducing agent successfully with gunmetal, and asked the lecturer if he had had any experience in this direction.

MR. FRANCIS agreed that silicon was a deoxidiser, and where 90 per cent. high conductivity copper was concerned, it might be suitable, but where the highest possible conductivity was demanded he did not think it should be used. The question of the vented core having been mentioned, he favoured its use in certain castings, and very effectively illustrated this on the blackboard.

MR. WALTON referred to the question of surging in the flat section casting shown on the screen, pointing out that in the old days the practice was to resort to blacking and sleeking. Was it possible that had such a thin section (¼ in.) been so treated, the surging of metal resulting in the rippled defect might not have occurred?

MR. FRANCIS agreed that this practice had to a large extent been dropped and its use in this instance would have been beneficial.

MR. H. SMITH rather doubted the Author's remarks on flame control.

MR. FRANCIS explained that control of the furnaces was sufficient in the case of bronzes and gunmetal, but fluxes were necessary for control with high conductivity copper and alloys. In small foundries they replaced flame control by flux. In highly organised foundries with scientific equipment much could be done by flame control.

Replying to the vote of thanks accorded him, Mr. Francis appreciated the interest in his Paper shown by the meeting, which it had been a privilege to address.

BOOK REVIEW

The Influence of Port Design on Open-hearth Furnace Flames, by J. H. Chesters, D.Sc., and M. W. Thring, M.A. Published by the Iron and Steel Institute, 4, Grosvenor Gardens, London, S.W.1. Price 16s.

There are but few foundry concerns in this country which utilise the open-hearth furnace as a melting medium for the production of castings. For these, this monumental Report—it runs to 180 pages—is of major importance. Practical steel-makers are well aware of the profound influence which port design has upon the working of a furnace. Unlike a small gas or oil burner, modifications in the design of open-hearth ports involve long-term experiments to assess their value. Moreover, to be worth while, a strict control has to be maintained throughout the period of the tests. Because these conditions have been fulfilled, the conclusions reached and printed at the end of the three sections, constitute the best information so far available. The extent of the practical work done in the preparation of this Report can best be realised by the bald statement that there are included no fewer than 89 tables and 134 illustrations. For those whose job involves the operation of gas producer fired furnaces this Report is invaluable.

V. C. F.

DIES FOR DROP STAMPS*

The process for making dies from the drop stamp usually entails: (1) Construction of a master form in wood or plaster; (2) casting from the master form a pattern in plaster of the lower or female die; (3) making a sand mould from the plaster pattern and pouring zinc alloy into the mould to form the lower die; and (4) using the lower die as a mould to produce the top die or punch, by pouring antimonial lead into the zinc mould.

This method of casting one tool from another is made possible by the difference between the melting point of zinc and lead and by the different amounts by which they contract, whereby a gap between the top and bottom dies is left, sufficient to allow for the thickness of the sheet.

Pattern-making

To produce tools by the method outlined above, it is first necessary to make a drawing of the part, which is divided by horizontal and vertical ordinates as shown in Fig. 1, and from these are made a series of sheet-metal templates as determined by the ordinates. When cut to shape, the sheet-metal templates are drilled and bolted together with spacing bars (Fig. 2), due allowance being made for contraction of the die metal. The space between the templates is filled in with rubble or sand, leaving ½ in. to ¾ in. for the plaster shell, which is reinforced with strips of cheesecloth lying between the templates. The ends of the model outside the templates are built up in solid plaster, a plan of the shape being marked out on the table. When the plaster has set, the filling is removed and the surface of the plaster model is varnished (Fig. 3).

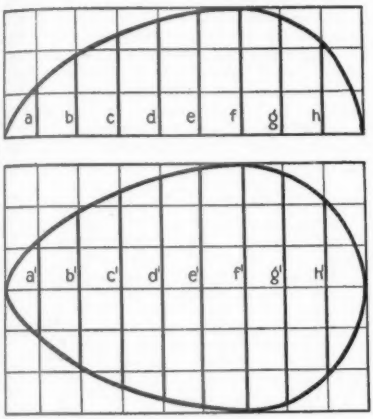


FIG. 1.—ORDINATE DRAWING FOR CONSTRUCTING THE FRAMEWORK OF THE PLASTER MODEL.

The plaster model is placed in a box, the walls of which are coated with stearine to prevent the plaster of the die pattern from sticking to it. Freshly mixed plaster is then poured and moulded in a layer over the pattern, cheesecloth being used as the reinforcement. The result of this process is a light, hollow plaster pattern of the bottom die (Fig. 4) which is used to make a sand mould.

A moulding box is placed over the reversed plaster pattern, and a highly permeable, naturally bonded sand with a minimum of moisture is rammed all round the pattern until it completely fills the box. The moulding box is reversed and the plaster pattern removed. The top section of the mould is prepared similarly, pouring and riser holes being provided. Before the top and bottom halves of the mould are assembled, the surfaces of each should be dusted with plumbago to ensure a smooth surface on the dies, and the moulds heated with a blowlamp flame a temperature of about 100 deg. C. to remove all moisture.

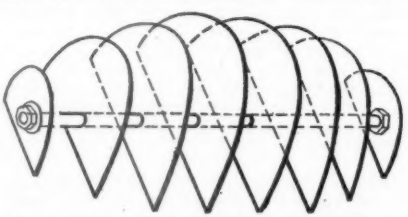


FIG. 2.—FRAMEWORK OF THE PLASTER MODEL BOLTED TOGETHER.

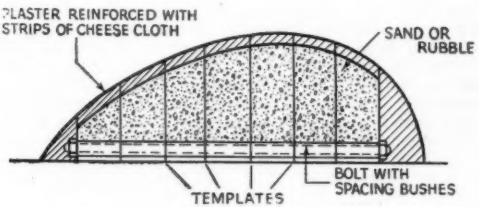


FIG. 3.

Casting the Die

The make-up of the mould ready for casting is illustrated in Fig. 5, showing runner box, gate, and riser. The size of the mould governs the size and number of risers required. The metal is conveyed from the furnace to the mould in a pouring-pot, and pouring

* Extracted from a bulletin published by the Aluminium Development Association—"The Formation of Aluminium and its Alloys by the Drop Stamp."

Dies for Drop Stamps

is continued until the molten metal becomes visible at the top of the risers. Molten metal may then be fed into each of the risers in turn to allow for shrinkage.

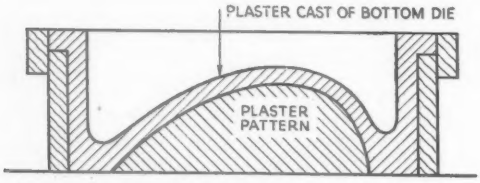


FIG. 4.

As the metal in the riser will solidify more quickly than the mass of metal inside the mould, it is advisable to stir this metal continually with a rod, adding molten metal until contraction inside is completed and the riser metal solidifies. When cool, the casting is removed from the mould boxes and the risers sawn off on a bandsaw. The casting is now ready for buffing and polishing inside, and machining top and bottom, as required.

Casting the Punch

The finished casting is then returned to the foundry, mounted in a casting box, and lead poured into the die to produce the top die or punch shown in Fig. 6, adhesion between the top and bottom dies being prevented by the use of plumbago. Bolts for fixing the die to the stamp may be cast in position during this operation. It is most important, when using antimonial lead, that the metal is adequately stirred right up to the moment of casting in order to ensure perfect mixing

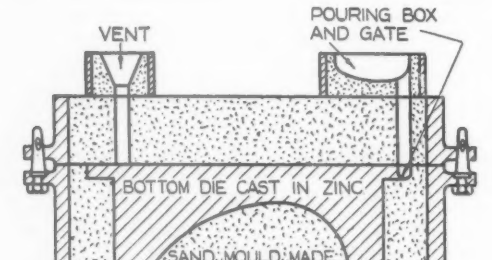


FIG. 5.—SECTION THROUGH MOULDING BOX FOR CASTING BOTTOM DIE.

of the lead with the lighter antimony-rich constituents. Antimonial lead castings need little finishing beyond scraping and polishing. The shrinkage of the punch on cooling is usually enough to allow for the thickness of the sheet metal between the dies, but care must be taken that the punch mates correctly with the bottom die. Punch and die are then mounted together and the top and bottom faces levelled to give accurate seating on the table and slide.

It is sometimes necessary to make the punch of zinc alloy instead of lead, as, with narrow punches, complicated shapes, or when an alloy which work-hardens rapidly during fabrication is being used, damage may be caused by a lead punch. As it is most difficult to cast molten zinc into a zinc mould at normal temperature without fusion of the mould by the ingoing metal, a plaster pattern should be prepared for the punch in a manner similar to that described for making the bottom die.

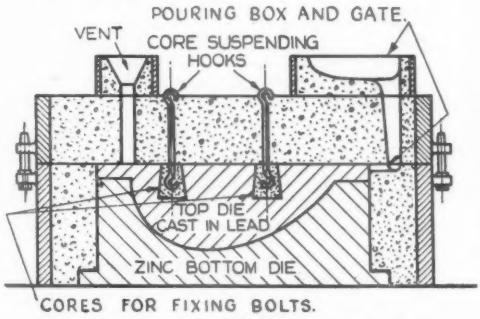


FIG. 6.—SECTION THROUGH MOULDING BOX FOR CASTING PUNCH IN BOTTOM DIE.

CARBON IN CUPOLA METAL

According to Mr. J. C. Richards, writing in "Notes on German Iron and Steel Foundries" (B.I.O.S. Final Report No. 818—Item 31), the control of the carbon content of cupola metal was effected in one large Ruhr foundry by the following empirical method:—It was based on the assumption that the total weight of the carbon in the pig-iron charged, less 5 per cent., plus the weight of the steel scrap charged, multiplied by 2.8 per cent. The "per cent.," we think, is wrong; it should be "multiplied by 2.8." It would be interesting to learn how this checks up with the practice in some of our readers' shops.

Nota Bene.—In a review of the Mond Nickel Company's publication "Ni-hard *versus* Abrasion," the address of the company was given as Thames House, Millbank, S.W.1, instead of Grosvenor House, Park Lane, London, W.1. A possible explanation would be the detachment of a label covering the pre-war address.

LOGARITHMS, SINES AND COSINES FOR MAKING AND CHECKING PATTERNS

By "CHECKER"

Often, the pattern-maker has to make patterns and core boxes from drawings which give the position of bosses by means of a radius, and an angle from the centre line. In many cases this gives sufficient data for the accurate positioning of the bosses as a square side may be conveniently near from which to place the protractor, and thus mark on the angle, and by means of striking the radius from the centre, the intersection point will give the centre of the boss; or

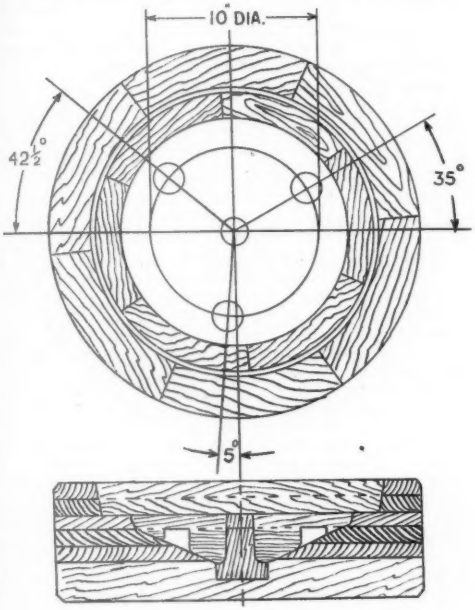
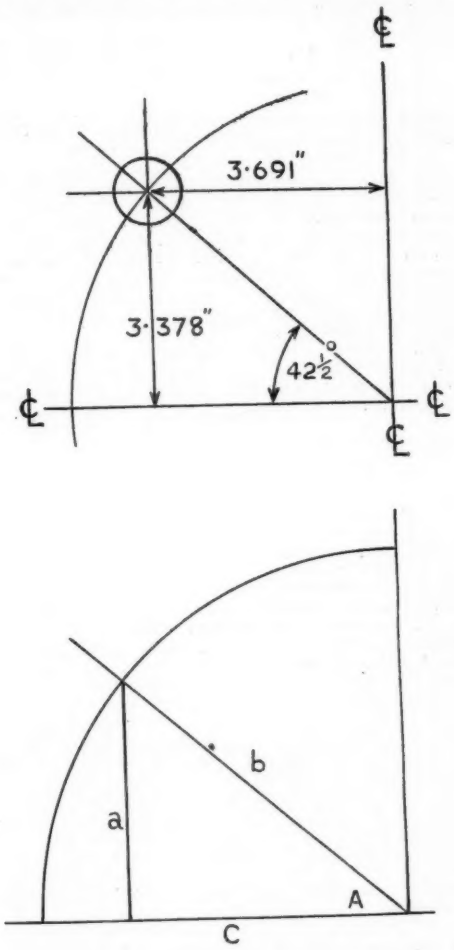


FIG. 1.—CORE BOX.

the angle may be one that is easily obtained by the bisection of the diameter, such as six bosses equally spaced at 60 deg., when by dividing the diameter into six equal parts the position of each of the bosses can be determined.

When, however, the angles are not so easy for division of the circle, a different means of obtaining the centre of the bosses may have to be employed. Fig. 1 shows a core box which required a tall centre boss, and three more on a 10-in. dia., and at the angles of 5, 35, and 42½ deg.; also with this class of work accuracy was and is essential, the pattern-maker having to work to fine limits.

To check these bosses the following method was employed, with the use of logarithm, sine, and cosine



FIGS. 2 (UPPER SKETCH) AND 3.

tables. First find the logarithm of the radius (5 in.)—this is 0.6990, then the logarithm of the sine of the angle 42½ deg., this is $\bar{1}$.8297 and the logarithm of the

Making and Checking Patterns

cosine of the same angle, which is $\overline{1}.8676$, add each to the logarithm of the radius separately thus:—

Log. of radius..	0.6990	0.6990	Log. of radius
Log. of sine ..	$\overline{1}.8297$	$\overline{1}.8676$	Log. of cosine
Total ..	0.5287	0.5666	

Now bring these totals back to inches by using the antilogarithm table, and 0.5287 = 3.378 in.
and 0.5666 = 3.691 in.

This gives the two dimensions required to find the centre of the boss working from the vertical and horizontal centre lines as shown in Fig. 2. Work out the other bosses along the same lines, and place the core box on its edge with the centre line parallel, the dimensions can then be marked on with the aid of a scribing block, and turning the core box round 90 deg., the other dimensions can be marked on, working from the other centre line.

Fig. 3 shows how the application of this method can be used for any boss, provided the radius and angle are given, and with b=radius, and A=angle the formula is as follows:—

Data Given.	Dimension Required.	Formula.
A, b ..	c	$c = b \times$ Cosine A
A, b ..	a	$a = b \times$ Sine A

It will be noticed that in the table given, the radius is multiplied by either the sine or cosine of the angle to get the dimension required, while earlier in the working out of the 42½ deg. angle the figures are found and substituted to others from the logarithm table, and then added together, and brought back to ordinary figures by the use of the antilogarithm table, but to add two numbers together from the logarithm table is the equivalent to multiplying ordinary figures, hence the use of logarithms, as it is much easier and quicker than multiplying in most cases.

If not to hand these tables can be obtained in book form, for the price of a few pence, and those not accustomed to the use of these tables will find with very little practice, they can work from them quickly and efficiently, but it must be borne in mind that only common logarithms have been used, not hyperbolic logarithms.

For simplicity, only one straightforward illustration has been given to demonstrate the method concerned, often on more complicated shapes it is the only method to guarantee the accurate checking of patterns and core boxes, as the checker has not the advantage of marking from square sides and faces before shapes are worked to size. With the dimensions being in decimals, it is an advantage to use a rule divided into $\frac{1}{10}$ and $\frac{1}{20}$ of an inch.

HOUSE ORGANS

Light Metals Review, Vol. VI, No. 1. Published by the British Aluminium Company, Limited, Salisbury House, London Wall, London, E.C.2.

It is pleasing once again, after an interval of six years, to receive this magazine, which was held in such high esteem in pre-war days. Regular fortnightly appearance is promised, and readers wishing to be placed on the circularising list should write to Mr. Freeman Horne, at the above address. The first issue of the revived house organ carries, in 26 pages, articles on the welding of aluminium; electro-depositing design; anodising and marine applications.

Steel Horizons, Vol. VIII, No. 4, published by the Allegheny Steel Corporation of Pittsburg. This issue carries beautifully illustrated accounts of the rubber industry, the designing of a prefabricated house, and the manufacture of yeast—all make special reference to stainless steel.

Malleable Iron Facts (*No.* 24). Published by the [American] Malleable Founders' Society. This issue is entirely devoted to detailing the potentialities of lorry wheel centres made from this material.

NEW CATALOGUES

Self-priming Water Pumps. A four-page leaflet received from Ransomes & Rapier, Limited, of Waterside Works, Ipswich, describes and illustrates a line of petrol, diesel or electrically-driven self-priming water pumps. The four-inch pumps are fitted with either steel or pneumatic road wheels, whilst the smaller ones, 1½ in. to 3 in., can be supplied mounted on a wheelbarrow. Diagrams show clearly how the pumps work and the outputs normally achieved.

Weldings. Application sheet No. 94, issued by the Lincoln Electric Welding Company, Limited, of Welwyn Garden City, Herts, illustrates a precision tapping machine made with a welded frame, side by side with one constructed from iron castings, and which latter it has replaced. It is claimed that over 50 per cent. of the machine man-hours have been eliminated by using welded steel. The base of this American designed machine tool is, however, still made of cast iron.

WELSH INDUSTRIES FAIR

The Welsh Industries Fair, to be held at the Royal Horticultural Hall, Westminster, S.W.1, from January 1 to 7, 1947, includes exhibits by foundry concerns. Sheppard & Sons, Limited, of New Foundry, Bridgend, Glam, are showing a non-ferrous melting furnace, together with an ingot casting machine; the Tubal Cain Foundry, of Tyndall Street, Cardiff—iron and non-ferrous castings and gear wheels; and Guest, Keen & Nettlefolds, Limited, of Castle Works, Cardiff—grey-iron castings and fireclay refractories.

INSTITUTE OF VITREOUS ENAMELLERS

ANNUAL BANQUET

The banquet organised in connection with the 12th annual congress of the Institute of Vitreous Enamellers, was held at the Grand Hotel, Birmingham, on November 15. MR. R. J. ROGERS presided over a distinguished company.

The civic toast was proposed by Mr. Barrington Hooper, C.B.E. (managing director of the FOUNDRY TRADE JOURNAL), who, after observing that Birmingham was, according to its publications, a city of a thousand trades and industries, said he would like to make it a thousand and one, because it had another very successful industry—that of a centre for conferences of various kinds. He thought he could claim that their conference had been a brilliant success, possibly because they were good fellows, but largely because they chose Birmingham, the city of a thousand industries in the heart of the Empire. Wherever they travelled they saw the products of Birmingham; the city had been well planned, but not over-planned; and while around it were many towns, there was also much beautiful country in the vicinity which had not been spoiled by that disease known as satellitis. It could be said of the Lord Mayors of Birmingham that they followed in a great tradition, for whatever their political views, their object was unswervingly to promote the interests of the city; and in that respect the present occupant of that office, whose name he coupled with the toast, was no exception.

Lord Mayor's Response

In response, the Lord Mayor (Ald. A. F. Bradbeer) said it gave him very great pleasure, as representing the citizens of Birmingham, to welcome that vast and important gathering to the city.

In the city there were ten thousand houses which had neither gas stoves nor electric stoves, and ten thousand houses which had no room for the products of their industry. Consequently the prosperity of their particular industry and of the city was more likely to flourish by a national policy of expansion, and the maintenance of a high and steady level of employment; and this was not incompatible with a high wage standard based on a high standard of production.

DR. H. W. WEBB, submitting the toast of "The Institute and the Vitreous Enamelling Industry," remarked that he had for a long time been associated with their sister industry, or should he call it the mother society—the Ceramic Society—and had followed with very lively interest the development both of the Institute and the industry of vitreous enamelling. Their industry had very close family ties with the pottery industry, particularly the sanitary and tile industries. Those ties were extremely close in one respect, because they all met in the bathroom. He thought it was a good sign of a wise and healthy outlook that they had an active association in being, which enabled them to discuss their particular problems and interests.

Experience had shown the failure of limiting their outlook to the walls of one production unit, and co-operation between them was a vital factor so far as the country was concerned, and also as regarded the smooth running of their industrial efforts. British manufacturers, in spite of what the countries said, were always ready to stand up to fair competition, and the basis of that competition could only be decided with the advice of those who were working in the particular industry concerned.

Their industry, like many others, was in some respects in a dangerous position at the present time, because there was a sellers' market, with their order books full up for years, and customers would in consequence scarcely dare to make complaints. That situation, unless guarded against, might ruin their efficiency, and it was happening at a time when it looked extremely difficult to plough back their profits into the business for reconstruction and development. There seemed to be so many obstacles or lack of encouragement; whether they would get that encouragement in the near future remained to be seen. If they did, he thought they would see a longterm revival of industrial efficiency which had not been witnessed for a very long time.

National College of Ceramics

At Stoke-on-Trent the authorities proposed to build before very long a National College of Ceramics, with all the important associated industries gathered in under that umbrella. The plans include the provision of working units in each section of this wide industry, in order that they could go further than the usual technological teaching, and actually instruct on all production units. He was hopeful in the not distant future to come to the Institute, and ask if it would like to be represented by a section covering iron enamelling. He felt that this scheme was not only of interest and importance to the ceramic industry, but the Minister of Education felt that for these different sections and industries it was desirable to have one national centre, so that the industry could be able to look to it for the training of their technologists.

It was with particular pleasure that he proposed the toast, and he was glad to couple it with the name

Institute of Vitreous Enamellers

of Mr. R. J. Rogers, the Institute's distinguished president.

Responding, Mr. Rogers said there must be something particularly attractive in Birmingham so far as the Institute was concerned: it was founded in Birmingham, and three conferences had been held there. The first gathering was held at the British Industries Fair at Castle Bromwich in February of 1934, when a founding committee was appointed. The Institute held its first annual conference in Birmingham in September of that year. Now, for half of the life of the Institute the country had been at war, and as with other similar organisations, its members had not been able to meet so frequently as before. Nevertheless, their members were able materially to assist the war effort in many directions. Their special knowledge and experience enabled them to utilise their furnace capacity for heat-treatment of metal components required in the manufacture of tanks, shells. and a thousand and one munitions of war. In the few years during which the Institute had been allowed to develop—that was half its life—they might claim that it had most effectively carried out the objects for which it was established.

Enamel Sign Trade

Although various forms of enamelling on metal began many centuries ago, the enamelling industry was not established until the middle of the 19th century, when enamel advertising signs were manufactured in this country. Some of the early workers in the sign trade went to America about 1890, and it was interesting to know that a Birmingham man, Louis Ingram, was responsible for the introduction of enamelled sign manufacture in America, and also pioneered the vitreous enamelling of table tops, gas cookers, heaters and the like.

In many establishments the preparation of enamel frit and the technique of enamel was a jealously guarded secret, and by the time the Institute was founded, 12 years ago, there was practically no interchange of technical knowledge and experience between those engaged in the industry. The formation of the Institute had been the most important factor in dispelling the old-fashioned ideas of regarding enamelling as a secret process. There was no room to-day for the jealous individual industrialist. The pooling of knowledge was essential if progress was to be achieved. One of the objects for which the Institute was established was "to provide facilities for the statement, discussion, and elucidation of scientific and technical and other problems relating to the industry." The council recognised that it was only by pooling knowledge, by research and the statement of experience, that the industry would keep abreast of scientific advancement, and by so doing provide the users of enamelled goods with the most durable and efficient articles.

The vitreous enamelling industry was concerned not only with the materials used in manufacture, but with many other problems connected with cast iron and sheet steels, and the design and performance of plant used in the process of enamelling. The Research Sub-committee of the Institute had, during the past 12 months, devoted a considerable amount of attention to the desirability of establishing a research association for the vitreous enamelling industry, and an appeal was now being made to the members for their financial support. In this connection the president quoted Sir Edward Appleton, Secretary of the Department of Scientific and Industrial Research, who, in speaking recently on "Research and the Smaller Firms," said: "The research association movement provides the best single means of bringing research and scientific knowledge within the reach of the smaller firms. An engineering firm could, for instance, join four or five research associations touching on various phases of their business, for fees which would amount in the aggregate to less than the salary of a single comparatively junior scientific worker."

Offers of collaboration, he was pleased to say, had already been made by the British Iron and Steel Research Association and other associations, and he wanted to thank Dr. Webb for the suggestion he had just mentionel in proposing the toast—"that when the National College of Ceramics is established, we as an industry may take some of our problems to that institution." Mr. Rogers was quite sure that the research sub-committee would keep that very closely in mind, and he hoped it would not be very long before they reminded Dr. Webb of the offer he had made. It was hoped that, whatever organisation was set up, some of the work would be delegated to the universities and technical colleges, and thus form a valuable training ground for recruits to the industry.

He was hopeful, therefore, that before the next annual conference, members, by their recognition of the value of research, and by their contributions, would succeed in the establishment of a research organisation for their industry.

In conclusion, Mr. Rogers thanked the past-president, Mr. John Gardom, and the chairman of the council, Mr. W. S. Grainger, for the enormous amount of work they had done, and their untiring efforts devoted to the interests of the members in recent years.

MR. J. W. GARDOM (immediate past-president) proposed the toast of "The Ladies and Our Guests," and observed that if they looked at the list of past-presidents they could see how closely the Institute was associated with the academic world; Dr. Webb was, he thought they would agree, one of the most delightful men that science had produced. They were also mindful of the interest taken in their work by Dr. Priestley. He would also particularly like to mention Mr. D. H. Wood, President of the Institute of British Foundrymen, and Dr. Harold Hartley, president of the British Cast Iron Research Association.

MR. NEVILLE SPERRYN, whose name was coupled with the toast, and is a brassfounder, in reply fully endorsed the president's call for greater output per individual. Having lost most of its capital abroad during the war, the nation could only recover its posi-

(*Continued at foot of next column.*)

THE INFLUENCE OF COBALT AND NICKEL IN VITREOUS ENAMEL GROUND-COATS

The following is the discussion of the Paper presented by Mr. Gordon C. Priddey at the annual conference of the Institute of Vitreous Enamellers, held at Birmingham last month. "The Influence of Cobalt and Nickel in Vitreous Enamel Ground-coats," was published in the FOUNDRY TRADE JOURNAL *for November 14.*

Discussion

MR. W. H. WHITTLE (past-president) said the lecturer had mentioned iron and not steel, but not any particular make of iron. In his (Mr. Whittle's) experience adherence of enamel to iron was very much better than in the case of steel. They obtained the best results with 0.05 per cent. cobalt. As a commercial proposition they found that cobalt had the nearest coefficient of expansion to iron, and that oxide of tin had the nearest coefficient of expansion to cobalt, so they were not likely to get hair lines.

MR. PRIDDEY replied that the reference to iron also applied to steel, with the exception of chemical reactions which definitely applied to iron as the element. He should say that most of the work had been carried out on "enamelling" steel.

Overlapping Theories

MR. BALL congratulated Mr. Priddey on a very sound summary of the theories that had been advanced and the work done in connection with the theories. He thought it was a mistake to try to sort the theories out and say that a particular one was right, because so many overlapped and so many appeared to be sound with certain exceptions. He felt that there was much truth in many of the theories and that the investigators had made the mistake of setting out to prove that here was one particular reason why cobalt or nickel, or a combination of the two, promoted adhesion. He thought that at least four or five of the reasons were true rather than any particular one. On page 3 of the pre-print, it seemed to him that the investigators were rather liable to be dogmatic on the effect of certain materials on an insufficiently wide range of enamel compositions. Kautz took one composition, which he described as clear enamel, and went on to say what addition of manganese, etc., worked, but he failed to make clear that the effect might be confined to the particular enamel composition that he was using. He (the speaker) did not agree that nickel, as an adhesion promoting oxide, was behind cobalt. The statement that manganese was useless suggested that enamellers had been wasting a lot of manganese for a good many years. As to the statement at the top of page 7 of the pre-print, that "scientific and practical experience has proved beyond doubt that cobalt and nickel are indispensable metals in the process of enamel-to-iron adherence," he thought it would be better to say that up to now they had been indispensable. A few years ago, one could have made exactly the same statement regarding, say, antimony as a smelter addition for making white frit, but later events had proved that it was lack of knowledge that prevented the use of other materials.

Complex Variables

MR. PRIDDEY agreed that the statement should be qualified, but called attention to the statement on page 5 of the pre-print, that "without such full knowledge it may well be queried whether cobalt and nickel are the best materials to use for the purpose." He was not satisfied that the true functions of cobalt or nickel were understood; here were so many complex variables that he would not like to be dogmatic.

MR. GRAY said he had had the opportunity of touring Scandinavian countries which had been either occupied or surrounded by the Germans, and he found that right through the war they had been forced to use sheet-iron ground-coats which were minus nickel and cobalt. He saw a large amount of the ground-coats actually in use, as well as much of the ware produced with that type of ground-coat. It was quite evident that during the war period the Germans were making and using, not only in their own country, but also exporting, sheet-iron ground-coats containing neither nickel nor cobalt oxides. He had heard it said by old enamellers that in their opinion cobalt was originally added to enamel to enable them to fire it at the correct temperature.

(*Continued overleaf, column* 2.)

INSTITUTE OF VITREOUS ENAMELLERS

(*Continued from previous column.*)

tion in the world's markets by working harder. Many people seemed afraid to face the truth, and unless the nation did set to work in earnest, when competition did come from abroad, it could never be faced, except by increased effort. It was unfortunate, coming at this difficult juncture, that the spirit of the age was to do less work instead of more, but the facts of the situation must be faced if this country was to recover its trading prestige. The Chamber of Commerce desired to make the British Industries Fair a success, and hoped to have the co-operation of industry in this renewed enterprise. The problems which they had to meet in their businesses appeared to him to be very similar, and they could best be solved by co-operation among healthy organisations such as theirs, which he wished every success in its efforts.

MR. W. S. GRAINGER acknowledged the compliment paid him by the president, and at his call a special welcome was given to Mr. J. H. Nicholls, sen., who was a friend of Louis Ingram (who started enamelling in the U.S.A.), and was between 80 and 90 years of age, being the oldest enameller in the country. Mr. Nicholls, in response, made a little speech, in which he said that after 66 years (and having gone through the mill) at this work, one has had enough.

WORKS MANAGEMENT AND PROFITS

By W. T. BRUCE

Industry is run for profits, and good management is the key to good profit-making. It needs, however, good financial control to aid good management in the making of profits. Good profits mean a substantial reserve fund—the life blood of all ambitious companies. Research and development cost money, and without it many companies just blunder along or go into liquidation.

Many companies do not believe in a substantial reserve fund, and that is why they cannot compete with companies that are controlled by more enlightened executives. How is it possible to develop, to improve facilities for production, to turn to new lines when necessary, without sufficient capital so to do?

Comparison of Costs

To maintain proper control it is necessary to summarise, then analyse all costs each month, and compare them from month to month. If this is not done there can be no "yard stick" for measuring performances. It is impossible to price properly without clear-cut cost control. One may be overlooking expenditure and charging too little for the product or individual products, and again one may be overcharging. Monies which should be charged to one product may actually be charged to another. The wrong allocation of time and material being the direct cause. Where there is the wrong allocation of expenditure for men and materials, it is usually due to incompetent organising by executives. This happens sometimes in various departments of one firm operating under individual managers where each department has to show a profit. There is the case of charging too much time and material, say, against tackle made for the foundry by the machine shop because the machine shop is not doing well in its own lines, or *vice versa*, where the foundry charges too much time to castings made for the machine shop because the foundry is making far too many rejections in its own lines, or again is not making its own lines fast enough to compete in the existing market.

Interlacing Charges

We come now to "interlacing charges." One may have foundry depts. Nos. 1, 2 and 3 respectively, the machine shops, the pattern shops, and the blacksmith's shops, and maybe the enamelling shop, each of which has got to make its own profit.

(1) The foundries make machine shop castings, and others, for sale;

(2) the machine shop makes foundry tackle, and its own lines for sale;

(3) the pattern shop makes patterns for Nos. 1, 2 and 3 foundries (each under different managers) respectively, and

(*Continued at foot of next column.*)

(*Continued from previous column.*)

(4) the blacksmith's shop makes its own lines and ladles, skimmers, rammers, etc., for Nos. 1, 2 and 3 foundries.

This is what gives rise to "interlacing charges." If there is no financial control, the incompetency of one department can be hidden by the excessive charging for man-hours and materials for work done to other departments.

The foreman puts excessive time on any particular job, and he cannot be checked immediately by the management. They do not work a centralised time study department to ask the reason why. There should be a time study department to co-ordinate time studies from all works, and there is no need to wait till the cost analysis is available. With time study data it can be checked right away. The summary to costs and analysis at the end of each month is a double check, and controls misplacement of man hours on materials as far as the higher executive are concerned.

INFLUENCE OF COBALT AND NICKEL

(*Continued from previous page.*)

MR. PRIDDEY said that very little work had been done on such matters as fluidity and rate of cooling. By adding cobalt they might not necessarily decrease the fusion temperature; they might increase the fusion point by the slagging of the cobalt. They might, however, very appreciably affect the fluidity and rate of cooling and by that means probably get a more tenacious bond, and a better coefficient of expansion.

MR. WHITTLE remarked that because they used a ground-coat in Sweden that was without cobalt, it did not follow that it was as good as if cobalt had been incorporated.

At this point the discussion was closed.

SWEDISH SPONGE-IRON POWDER

Swedish sponge-iron powder is now available on the United States market at a price that is lower than pre-war imports, reports "Iron Age." There are now two grades of iron powder available and there will soon be another placed on the market, all three of which are said to excel the pre-war grade in iron content and lowered impurities. The improved purity of the powder should, according to its makers, permit it to enter markets hitherto closed to it, such as for higher-strength parts and alloyed-iron parts. It may also be able to enter the electrical field in competition with some higher-priced iron powders. The newly-established price policy for Swedish iron powder means, perhaps, more toward an expansion of its market than the quality improvement. Some parts now fabricated by methods other than powder metallurgy, because the cost of metal plus machining costs are now enough not to justify compacting from iron powders, are expected to be converted to this means of production, thus expanding the tonnage of iron powders consumed.

IMPORTS AND EXPORTS OF IRON AND STEEL

BOARD OF TRADE RETURNS FOR OCTOBER

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in October and in the first 10 months of 1946. Figures for five-sixths of 1938 are given for purposes of comparison.

Total Exports of Iron and Steel.

Destination.	October, 1946.	Ten months ended October.	Five-sixths of 1938.
	Tons.	Tons.	Tons.
Eire	6,674	53,802	46,433
Channel Islands	379	4,396	6,180
Palestine	8,488	81,645	6,726
British West Indies	3,332	36,045	41,453
Union of South Africa	14,565	196,836	199,573
Northern Rhodesia	277	2,592	17,146
Southern Rhodesia	1,426	39,057	30,177
British East Africa	3,334	25,396	21,610
British India	8,212	65,472	132,232
Burma	218	11,303	15,427
British Malaya	5,135	31,609	55,487
Ceylon	1,027	11,671	21,693
Hong Kong	2,686	14,955	19,663
Australia	2,358	28,897	142,420
New Zealand	3,473	37,737	109,903
Canada	1,260	8,353	71,174
British West India Islands	4,133	23,817	36,876
Anglo-Egyptian Sudan	681	13,936	6,909
Other British Countries	3,377	26,165	18,275
Soviet Union	486	526	3,624
Finland	5,275	42,645	14,673
Norway	2,974	60,823	16,894
Iceland	995	10,710	549
Denmark	11,916	179,881	72,713
Poland	128	13,248	2,073
Netherlands	7,285	132,250	42,966
Dutch East Indies	565	7,355	22,756
Dutch West India Islands	963	8,858	2,053
Belgium	1,783	26,856	16,937
France	1,182	59,757	11,156
Portugal	1,245	38,351	6,427
Portuguese East Africa	313	4,069	11,850
Spain	441	7,988	6,470
Italy	880	7,007	4,283
Greece	5,169	18,881	1,460
Turkey	1,364	10,785	11,464
Egypt	5,321	79,868	28,674
Iraq	7,036	50,513	21,450
Iran	6,297	70,990	91,983
China	5,155	19,839	18,443
U.S.A.	175	889	1,823
Venezuela	3,723	29,434	3,896
Ecuador	357	3,982	1,327
Chile	1,004	5,228	5,244
Brazil	2,324	38,734	14,159
Uruguay	1,356	11,097	6,323
Argentine	5,878	70,377	66,130
Other Foreign Countries	19,155	211,794	96,429
Total	171,780	1,936,419	1,596,562

THE INDUSTRIAL WELFARE SOCIETY'S postal course in industrial law, which has now been successfully conducted for some years, consists of six lectures. These are constantly reviewed so as to be up to date, and cover the whole field of employment and factory law, with which management and executives in industry are concerned. Particulars of the course can be obtained from the Secretary, Industrial Welfare Society, 14, Hobart Place, Westminster, London, S.W.1.

Total Imports of Iron and Steel.

From	October, 1946.	Ten months ended October.	Five-sixths of 1938.
	Tons.	Tons.	Tons.
British India	756	14,586	129,694
Australia	2,897	90,207	30
Canada	3,497	92,724	97,813
Other British Countries	1,401	2,488	4,666
Sweden	634	3,229	74,830
Norway	3,433	10,665	28,146
Belgium	1,992	10,762	228,067
Luxemburg	—	399	48,834
France	88	328	214,456
U.S.A.	41,490	200,914	167,243
Other Foreign Countries	76	3,075	126,460
Total	56,264	429,377	1,120,225
Iron ore and concentrates—			
Manganiferous	16,340	112,852	51,903
Other sorts	571,480	5,406,975	4,251,559
Iron and steel, scrap and waste, nt only for the recovery of metal	21,426	386,891	526,836

Exports of Iron and Steel by Products.

Product.	October, 1946.	Ten months ended October.	Five-sixths of 1938.
	Tons.	Tons.	Tons.
Pig-iron	3,290	16,343	78,284
Ferro-alloys, etc.—			
Ferro-tungsten	7	230	430
Spiegeleisen and ferro-manganese	2,123	47,341	4,330
All other descriptions*	52	876	873
Ingots, blooms, billets and slabs	577	3,731	8,120
Iron bars and rods	286	8,584	2,664
Sheet and tinplate bars	—	203	10,317
Wire rods and bright steel bars	4,081	45,874	8,140
Other steel bars and rods	15,154	212,953	85,006
Special steel	1,624	14,837	4,110
Angles, shapes and sections	6,827	117,789	56,170
Castings and forgings	191	2,438	1,349
Girders, beams, joists and pillars	2,822	56,252	27,893
Hoop and strip	4,291	62,916	31,147
Plates, ¼ in. thick and over	18,282	253,582	109,137
Black plates	1,016	20,227	12,116
Black sheets	2,672	39,557	59,926
Galvanised sheets	2,549	28,816	122,446
Tinplates	10,904	93,550	266,096
Tinned sheets	218	2,117	1,176
Terneplates	564	1,641	3,604
Decorated tinplates	14	478	3,640
Cast-iron pipes, up to 6-in. dia.	4,763	38,188	40,773
Do., over 6-in. dia.	2,326	27,385	35,803
Wrought-iron tubes	29,317	226,567	183,310
Steel rails	4,201	142,572	88,333
Sleepers and fishplates	5,323	87,376	21,153
Other railway material	1,406	20,735	22,310
Wire	6,140	65,278	45,986
Wire manufactures	4,346	30,147	24,574
Nails, tacks, etc.	1,035	7,109	3,173
Rivets and washers	887	7,530	7,113
Wood screws	366	4,583	2,093
Bolts, nuts, and metal screws	2,217	20,221	14,644
Stoves, grates, etc.	588	5,096	7,626
Sanitary cisterns	93	878	2,343
Fencing material	684	3,475	4,276
Anchors, etc.	690	4,994	5,280
Chains	967	7,772	5,243
Springs	357	4,739	3,276
Hollow-ware	9,478	65,526	8,920
All other manufactures	19,052	135,913	180,403
Total	171,780	1,936,419	1,596,562

* The figures for 1946 are not completely comparable with those for earlier years.

NEWS IN BRIEF

R. T. METAL PRODUCTIONS, LIMITED, is being wound up voluntarily. Mr. T. Griffiths, 47, Park Street, London, W.1, is the liquidator.

EQUIPMENT SMASHED in the landings on the Normandy beaches is being brought back to England to help make good the steel shortage.

METAL PROTECTION, LIMITED, is being wound up voluntarily. Mr. V. G. Stanshall, 2-3, Salisbury Court, Fleet Street, London, E.C.4, is the liquidator.

ENGINEERS & FOUNDERS (SALAMPTON), LIMITED, is being wound up voluntarily. Mr. H. T. W. Smith, 125, Selly Park Road, Birmingham, 29, is the liquidator.

THE BOARD OF TRADE announce that the Industrial Ten clothing coupon supplement for 1946-47 were being issued on and after December 2. No changes have been made in the arrangements for obtaining the coupons.

MR. W. E. DICKIE, representative of the Federation of British Industries on the Scottish Film Council, has been appointed chairman of a panel to organise and develop the use of films in industry which was formed at a meeting in Glasgow.

THE GENERAL EXECUTIVE COUNCIL of the Confederation of Shipbuilding and Engineering Unions have decided to press for a five-day working week, but to accept for the time being 42½ hours instead of the 40 hours originally demanded.

MR. OLIVER LYTTELTON has been elected chairman of the Conservative Parliamentary Trade and Industry Committee and Mr. Harold Macmillan deputy-chairman. The vice-chairmen are Sir Arnold Gridley (industry) and Mr. Walter Fletcher (commodities).

AFTER HE HAD CUT the first sod at the first two of the five new industrial estates to be developed in Glasgow, the Lord Provost, Sir Hector M'Neill, said that plans had already been drawn up for a scheme of flatted factories on a site off Parliamentary Road.

A FILM made in the company's own foundry was shown to foundry workers' families in the canteen of the National Gas & Oil Engine Company, Limited, Ashton-under-Lyne. The film shows the work in the foundry from the arrival of the raw materials to the despatch of the finished castings to the machine shops.

THE PARTNERSHIP between Samuel Henry Nock and James MacPherson Niven, carrying on business at 3-5, Bower Way, Slough, Bucks, under the style of the Cippenham Casting Company, has been dissolved by mutual consent. All debts due to or owing by the firm will be received and paid by J. M. Niven, who will continue the business under the present style.

A NORTH-EASTERN GROUP of the Industrial Applications section of the Royal Statistical Society has been formed, centred on the Tyne and Wear areas, and including a Tees-side sub-group. The hon. secretary of the new group is Mr. J. Elliott, Leamington Glass Works, Leamington-on-Tyne, Northumberland, and of the sub-group is Mr. J. T. Richardson, Research Department, Imperial Chemical Industries, Limited, Billingham, Co. Durham.

AT THE REQUEST OF the Board of Trade, the Ministry of Food have agreed to make reasonable quantities of dextrine available to manufacturers who normally use glue or gelatine. It is hoped that this will help to alleviate the present shortage of glue. Manufacturers who can substitute dextrine for glue or gelatine are invited to apply to the Ministry of Food, Starch Division, London Road, Stanmore, Middlesex, for a permit to acquire supplies.

STIRLINGSHIRE IRONFOUNDERS are to contribute £5,000 of the £7,000 required to purchase Burnbank Foundry, Falkirk, for the training of boys in the light-castings industry. Final details are to be negotiated with the County Education Authority representative by a small committee composed of Mr. W. H. Smith, of Allied Ironfounders, Limited, Mr. A. C. Bernard, of the Carron Company, and Mr. A. M'Nab Chassells, assistant to the chairman of the National Light Castings Ironfounders' Federation.

OBITUARY

MR. JAMES GILLESPIE, who was formerly chief engineer at the Dalzell Steel Works, Motherwell, of Colvilles, Limited, died recently at the age of 86.

MR. ARCHIBALD GRANVILLE SIMS, chairman and managing director of Robert Cort & Son, Limited, engineers and ironfounders, etc., of Reading, died on November 22.

COL. EDGAR ARTHUR WILSON, managing director of Evered & Company, Limited, brassfounders, metal rollers, etc., of Smethwick, died last week at the age of 53. He was a Deputy-Lieutenant of Staffordshire.

SIR BERKELEY SHEFFIELD, of Normandy Park, Scunthorpe, has died at the age of 70. The details of his career as a soldier, landowner, and politician are well known. At one time he became interested in the foundry industry and was an original director of Southern Foundries, Limited (now part of Federated Foundries, Limited). He took the initiative in creating the British Ironfounders' Association as a successor to the old National Light Castings Association, though he never took any active part once the Association was formed.

MR. G. G. COPPEL died in London on November 16 at the age of 92. Until his retirement in 1931 he was managing director of two Sheffield steel firms, J. J. Saville & Company, Limited, and William Jessop & Sons, Limited. He was intimately concerned in the development of the manufacture and use of high-speed steel. Mr. Coppel was born in Solingen, Germany, but came to England in his early teens and was naturalised more than 70 years ago. He served an apprenticeship with several Sheffield steel firms before joining the late Mr. J. J. Saville to found J. J. Saville & Company, Limited.

PIG-IRON AND STEEL PRODUCTION IN GREAT BRITAIN

The following particulars relating to pig-iron and steel production in Great Britain have been extracted from the Statistical Bulletin for October, 1946, issued by the British Iron and Steel Federation. Table I gives the production of pig-iron and ferro-alloys in September, with the number of furnaces in blast at the end of the month; Table II, production of steel ingots and castings in September; and Table III, deliveries of alloy and non-alloy finished steel. Table IV summarises the activities of the steel industry as a whole during the six months ended September, 1946.

TABLE I.—*Production of Pig-iron and Blast-furnace Ferro-alloys (Thousands of tons.)*

District.	Furnaces in blast, 28.9.46	Weekly average production, September, 1946. Hematite.	Basic.	Foundry.	Forge	Ferro-alloys.	Total.
Derby, Leics., Notts., Northants, and Essex	24	—	14.3	18.3	1.3	—	33.9
Lancs. (excl. N.W. Coast), Denbigh, Flint- and Ches. / Yorkshire (incl. Sheffield, excl. N.E. Coast)	5	—	5.8	—	—	0.6	6.4
Lincolnshire	13	—	22.0	—	—	—	22.0
North-East Coast	26	5.9	29.6	0.7	—	1.8	38.0
Scotland	10	0.6	8.6	2.7	—	—	11.9
Staffs., Shrops., Worcs. and Warwicks	7	—	5.6	1.1	—	—	6.7
S. Wales and Monmouthshire	7	2.7	15.3	—	—	—	18.0
North-West Coast	6	10.4	—	—	—	—	10.4
Total	98	19.6	101.2	22.8	1.3	2.4	147.3
August, 1946	98	20.8	98.4	22.5	1.3	2.3	145.3
September, 1945	99	21.9	94.3	19.8	1.5	2.0	139.5

TABLE III.—*Deliveries of Alloy and Non-alloy Finished Steel. (Thousands of tons.)*

Product.	Weekly average. 1944.	1945.	1945. Sept.	1946. August.	1946. Sept.
Non-alloy Steel:					
Heavy rails and sleepers	6.5	7.1	7.4	8.9	8.0
Heavy and medium plates	30.8	26.4	28.7	23.8	35.2
Other heavy products	38.2	33.1	29.4	29.9	35.1
Light rolled products (excl. wire rods and alloy-steel bars)	46.2	41.9	45.1	44.2	54.3
Ferro-concrete bars	2.1	1.8	2.8	2.9	3.1
Cold-rolled strip	4·2	4·0	4·1	4·0	4·9
Bright steel bars	4.9	3.9	3.7	4.3	5.2
Sheets, incl. coated	21.2	20.2	20.7	20.1	24.9
Tin, terne and black plate	10.0	9.5	10.8	7.4	10.9
Tubes and pipes	12.3	10.9	11.8	12.9	15.0
Steel wire	12.2	10.2	10.7	10.5	13.1
Tyres, wheels and axles	2.6	2.5	2.8	2.8	4.2
Forgings	5.9	5.3	5.1	4.6	5.2
Castings	5.1	4.1	3.5	3.0	3.0
Total	202.2	180.9	186.6	179.3	222.1
*Alloy Steel**:					
Plates	1.9	1.1	0.8	0.1	0.3
Tubes and pipes	0.6	0.3	0.2	0.4	0.3
Bars, sheets, strip and wire	5.6	3.0	2.9	2.5	3.2
Forgings	5.0	2.2	1.9	1.4	1.7
Castings	1.7	0.9	0.8	0.6	0.5
Total	14.8	7.5	6.6	5.0	6.0
Total U.K. production†	217.0	188.4	193.2	184.3	228.1
Less Intra-industry conversion	24.5	17.8	18.2	11.4	20.4
Total net U.K. deliveries	192.5	170.6	175.0	172.9	207.7
Add Deliveries of imported finished steel	5.0	1.0	1.9	—	—
Total deliveries of finished steel	197.5	171.6	176.9	172.9	207.7

* Excluding high-speed steel.
† Includes finished steel produced in the U.K. from imported ingots and semi-finished steel.

TABLE II.—*Production of Steel Ingots and Castings. (Thousands of tons.)*

District.	Weekly average production, September, 1946. Open-hearth. Acid.	Open-hearth. Basic.	Bessemer.	Electric.	All other	Total.* Ingots.	Total.* Castings.	Total ingots and castings.
Derby Leics., Notts, Northants, and Essex	—	—	(Basic) 7.1	1.0	0.4	8.0	0.5	8.5
Lancs. (excl. N.W. Coast), Denbigh, Flints, and Ches. / Yorkshire (excl. N.E. Coast and Sheffield)	1.	20.7	—	0.4	0.3	21.8	0.8	22.6
Lincolnshire	—	25.2	—	—	0.2	25.2	0.2	25.4
North-East Coast	3.7	46.3	—	0.6	0.4	49.7	1.3	51.0
Scotland	4.0	20.3	—	0.5	0.6	23.9	1.5	25.4
Staffs., Shrops., Worcs. and Warwicks	—	12.2	—	0.5	0.6	12.2	1.1	13.3
S. Wales and Monmouthshire	5.8	38.1	(Basic) 3.5	0.6	0.1	47.9	0.2	48.1
Sheffield	8.2	21.6	—	6.2	0.5	35.0	1.5	36.5
North-West Coast	—	3.0	(Acid) 4.6	—	0.1	7.6	0.1	7.7
Total	22.9	187.4	15.2	9.8	3.2	231.3	7.2	238.5
August, 1946	20.9r	178.5r	14.8	8.9	2.9	219.4	6.6	226.0
September, 1945	24.7	183.7	18.7	10.0	3.5	232.8	7.8	240.6

* Including alloy.

(Continued at foot of next page.)

ENGINEERS' FIVE-DAY WEEK

NATIONAL BONUS TO BE INCREASED

As a result of an agreement reached last week between representatives of the Engineering and Allied Employers' National Federation and the National Engineering Joint Trades Movement, a five-day week of 44 hrs. will become general throughout the engineering industry in the New Year. The agreement is subject to confirmation by the constituent bodies of the two organisations. Provision is made for the reduced hours to be spread over five and a half days in special cases, where it is a matter of working in conjunction with other industries.

In order to maintain present wage levels for the reduced hours, it was agreed that the national bonus for adult male workers should be increased, and paid for the reduced hours. The workers originally asked for a 40-hr. week, and workers from engineering factories demonstrated in favour of the full claim for a reduction to 40 hrs. outside the employers' offices during last week's negotiations.

A.D.A. STAFF APPOINTMENTS

The Aluminium Development Association have appointed Mr. G. R. L. Watkins as naval architect. He has been on the design staff of Cammell Laird & Company, Limited, for the past 10 years. Mr. J. C. Bailey, who has been acting as information officer on the staff of A.D.A. for the past 12 months, has now been appointed liaison officer to co-ordinate the work of the technical committees and senior technical staff. He was for some years on the research staff of I.C.I. Metals, Limited. Prior to the war, Mr. Bailey was with Murex Welding Processes, Limited.

Mr. N. B. Vaughan has been appointed information officer and librarian to the Association. For the past seven years he has acted as editor of publications of the Institute of Metals. Mr. F. L. Stafford, who until recently was chief mechanical engineer to the Paraguay Central Railway, has been appointed railway transport engineer to A.D.A.

IN PARLIAMENT

Steel Exports

MR. STOKES asked the Minister of Supply why, for the nine months ended September 30, 1,766,245 tons of steel were exported compared with 1,436,906 tons for the corresponding period in 1938, whereas only 373,186 tons were imported compared with 1,008,203 tons in the same period; and what steps he proposed to take to make good the deficit of 960,000 tons urgently required for industry at home.

MR. LEONARD, who replied, said that the substantial volume of exports in the early months of 1946 was due to the fact that the heavy pressure of home demand for steel did not develop until some months after the end of the war against Japan. There was thus a margin of steel production which was taken up by urgent export orders, on which deliveries continued in the early part of 1946. As soon as the domestic position became difficult, steps were taken to reduce the amount of steel allotted for export and to introduce a special licensing system for exports, with the object of ensuring that steel was only exported where failure to do so would be directly detrimental to the wider interests of the U.K. economy.

London Metal Exchange

MR. WILMOT, Minister of Supply, told Sir W. Wakefield that no decision had yet been taken about the reopening of the London Metal Exchange.

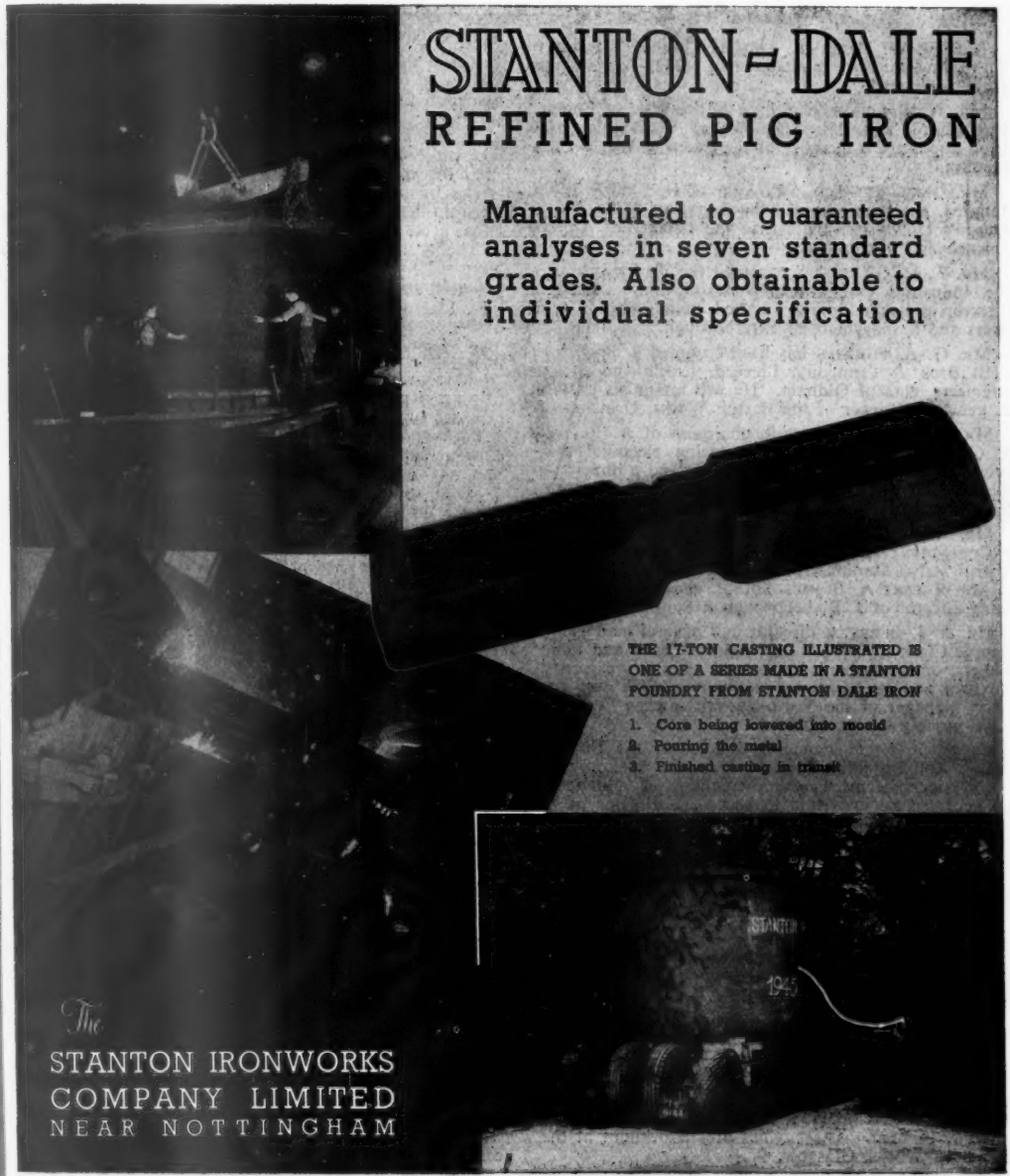
HAVING BEEN ACQUIRED by Dorman, Long & Company, Limited, as a site for new offices, the Royal Exchange, Middlesbrough, which for over 70 years has been the hub of the iron and steel trade of the North of England, is to be closed at the end of the year. Since the disappearance of the warrant market and the establishment of controlled prices, the vast Exchange hall has largely fallen into disuse, but the directors of the Exchange intimate that, if a substantial body of members wish to maintain a weekly meeting, an endeavour will be made to find suitable accommodation.

PIG-IRON AND STEEL PRODUCTION IN GREAT BRITAIN (*Continued from previous page.*)

TABLE IV.—*General Summary of Pig-iron and Steel Industry.* (*Weekly Average in Thousands of tons.*)

Period.	Iron-ore output.	Imported ore consumed.	Output of pig-iron and ferro-alloys.	Scrap used in steel-making.	Steel (incl. alloy).			Steel stocks held by producers, etc.*
					Steel imports.	Output of ingots and castings.	Deliveries of finished steel.	
1944	297.6	46.8	129.5	141.7	26.6	233.5	197.5	2,171.0
1945	272.5	77.2	136.7	138.5	2.9	227.3	171.6	1,683.9
1946—April	243.5	111.4	148.7	152.4	5.6	252.1	184.6	1,129.6
May	244.9	115.1	151.2	159.1	10.6	261.8	203.4	1,146.1
June	225.5	118.7	151.5	142.9	9.0	239.8	191.8	1,130.7
July	220.3	119.4	147.0	137.5	6.5	226.1	176.6	1,160.6
August	223.6	118.9	145.3	134.9†	10.2	226.0	172.9	1,198.9
September	229.3	118.3	147.3	144.1	13.3	238.5	207.7	1,186.8

* Stocks at the beginning of the years and months shown. † Revised.


STANTON-DALE
REFINED PIG IRON
Manufactured to guaranteed analyses in seven standard grades. Also obtainable to individual specification
THE 17-TON CASTING ILLUSTRATED IS ONE OF A SERIES MADE IN A STANTON FOUNDRY FROM STANTON DALE IRON
1. Core being lowered into mould
2. Pouring the metal
3. Finished casting in transit
The
STANTON IRONWORKS
COMPANY LIMITED
NEAR NOTTINGHAM

PERSONAL

MR. W. W. HACKETT, who has been a director of Tube Investments, Limited, since 1922, has resigned from the board.

MR. A. W. GRANT, chairman of the West of England Engineering and Allied Employers' Association, has been appointed a member of the Catering Wages Commission.

MR. DENIS REBBECK, a director of Harland & Wolff. Limited, has been awarded the degree of M.Sc. by the Queen's University, Belfast, in the Faculty of Applied Science and Technology.

MR. E. H. GILPIN has accepted the chairmanship of the Industrial Co-partnership Association. He is a director of Baker Perkins, Limited, manufacturing engineers and foundrymen, of Peterborough.

MR. G. A. PHILLIPS has been co-opted a director of Platt Bros. & Company, Limited, textile and general engineers, etc., of Oldham. He will retain his position as general manager of the Barton Works, Urmston.

MR. A. G. WANSBOROUGH, chairman of A. Reyrolle & Company, Limited, manufacturing electrical engineers, etc., of Hebburn, Co. Durham, and a director of the Bank of England, has been appointed a member of the Colonial Economic and Development Council.

MR. J. M. STOREY, managing director of Dewrance & Company, Limited, has been elected chairman of the British Valve Manufacturers' Association, in succession to MR. ROBERT A. BLAKEBOROUGH, chairman and managing director of J. Blakeborough & Sons, Limited.

MR. A. J. BERRY, a director and general manager of George Clark (1938), Limited, marine engine and boiler makers, of Sunderland, has retired after 40 years with the firm and its associated companies. He was formerly manager of the North-Eastern Marine Engineering Company (1938), Limited.

MR. C. S. GILL, managing director of the Davy & United Roll Foundry, Limited, Haverton Hill-on-Tees, and president of the Tees-side Chamber of Commerce, has accepted an invitation to become a director of Le Tourneau (Gt. Britain), Limited, whose new factory for the manufacture of earth-moving equipment at Stockton was formally opened in October. Mr. Gill is retaining his present executive position with the Davy & United Roll Foundry.

Wills

ALEXANDER, J. B., brassfounder, of Broughty Ferry £9,225

MARSTON, SIR CHARLES, chairman of the Villiers Engineering Company, Limited, Wolverhampton £257,200

THE PROPELLING MACHINERY for four vessels being built by Canadian-Vickers, Limited, at Montreal, for the French Government, is to be supplied by Harland & Wolff, Limited. The engines are to be built at the Finnieston Works, Glasgow.

ALUMINIUM SHEET PRODUCTION

NEW CONTINUOUS ROLLING MILL AT NEWPORT

On a 100-acre site at Rogerstone, near Newport, Mon., a continuous-type rolling mill is under construction for the mass production of aluminium sheet products. It is due to be completed in 1948. The only continuous rolling mills for aluminium are, at the present time, in the United States, but it is expected that the expansion at Rogerstone, embracing a main series of rolling machines more than a quarter of a mile in length, will result in production methods as efficient as those in any country.

The cost of the plant and equipment will be more than £2,500,000. This investment by the Northern Aluminium Company, Limited, an associate of the Canadian corporation, Aluminium, Limited, will increase the importance of the United Kingdom as a market and as a centre of aluminium fabrication. The Rogerstone plant will provide employment for several thousand workers, while the sheet production will help to meet a pressing demand for aluminium for housing materials, cars, railway carriages, food containers, and manufactured goods of all kinds. An output of 50,000 tons of sheet products per annum is planned and this can be extended to 150,000 tons if necessary. The greatest annual rate of aluminium sheet production, during the war, from all plants in the United Kingdom, was just over 100,000 tons. Britain obtains the bulk of her raw aluminium from Canada, which, in turn, depends on British Guiana for its supply of the raw material, bauxite. The Rogerstone site was originally occupied by a steelworks, but in August, 1939, it was taken over by the production department of the Air Ministry and allocated to the Northern Aluminium Company, Limited, for the production of aluminium alloy sheet and extrusions for aircraft. By the end of 1943, the scheduled output had been increased to five times the original target, thus making the plant the biggest of its kind in the country. During the days of peak war production, more than 8,000 previously inexperienced workers were employed, the majority of them drawn from the depressed areas of the Western valleys. In June of this year, the Northern Aluminium Company acquired the plant on a permanent basis and the expansion plans started.

DARLINGTON & SIMPSON ROLLING MILLS, LIMITED, are completing a £700,000 factory for rolling steel suitable for metal windows. The factory will make sufficient steel for the windows of 200,000 houses annually.

IN HIS REPORT to the members of the British Valve Manufacturers' Association on the Executive Committee's activities during the past year, Mr. R. A. Blakeborough, the chairman, referred to the standard conditions of sale which had been issued to members. It was, he said, most useful to have uniform conditions applicable to the valve industry. He also referred to the plans for the formation of a hydraulic research association, in which the Government were taking a keen interest.

THE UNITED STEEL COMPANIES LTD

WORKINGTON CYLINDER IRONS

The requirements of engine cylinders, whether for the automobile or the massive marine diesel, can be met from the Workington range of special cylinder irons. And not, of course, cylinders alone, but all engineers' castings requiring the same properties of soundness, hard wearing and ready machinability. All Workington Irons are supplied in the machine-cast form, easily handled, uniform, sand free and without waste. "UCO" Refined Irons, made from virgin blast-furnace metal without re-melting or the addition of scrap, are supplied for the requirements of "high-duty" specifications.

WORKINGTON IRON & STEEL COMPANY

WORKINGTON Telephone: Workington 206 Telegrams: "Mosbay," Workington CUMBERLAND

Branch of The United Steel Companies Limited.

W. 75.

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

Barwise (Engineers), Waller Street Works, Greystone Road, Carlisle—£1,000. D. Thomson, E. G. Fletcher, and G. D. Parker.

Swancraft Production & Engineering Company, 66, Kings Road West, Swanage, Dorset—£1,000. A. G. and G. H. Owen-Ellis.

C. H. Clarke & Company (Engineers), Sentinel Works, Berry Street, Hockley, Birmingham—£2,000. C. H., J. W., and C. E. Clarke.

Thomas Hall & Sons (Llansamlet), Engineering Works, Lowe Road, Llansamlet—Engineers. £3,000. R. W. A., and T. Hall.

N. Trup & Company, 17, Red Lion Square, Holborn, London, W.C.1—Consulting and working engineers, etc. £1,000. N. and A. Trup.

Dagnall & Kendall, 7, St. Paul's Square, Bedford—Mechanical and general engineers, etc. £5,000. H. Dagnall and T. J. Kendall.

Whippett Manufacturing Company, 114, High Street, Hounslow—High-pressure diecasters, etc. £1,000. A. H. and R. D. Hanning.

Construction Engineers & Woodcrafts (Leeds), 12, Garden Street, Leeds—£2,000. J. Lancaster, D. A. Mitchell, and F. Snowden.

Specialised Machinery Repairs, Bedford Row House, 58, Theobalds Road, London, W.C.1—£1,000. R. L. Davis and P. O. Rippingal.

R. H. Sweeney, 61-62, Wind Street, Swansea—Manufacturers of dynamos, motors, etc. £5,000. R. H. Sweeney and E. E. Williams.

A.G.S. Construction Company, 15, Copthall Avenue, London, E.C.2—Mechanical and general engineers, etc. £1,000. A. J. and E. A. Soar.

L. & B. (Patents)—Heating and ventilating engineers, etc.—£5,000. E. G. Brown, 4a, Manor Parade, London, N.16, and H. E. A. Lehmann.

John Roper & Son, Gear Works, Villiers Street, Wolverhampton—Gear cutters and general engineers. £12,000. F. L. and A. J. Roper.

Lynn-Harding Company, 363, Seven Sisters Road, London, N.15—Engineers, etc. £1,500. P. J. Lynn, F. D. Harding, and E. A. Grove.

G. T. Edwards (Ilkeston), 126, Nottingham Road, Ilkeston—Engineers, etc. £6,000. G. T. Edwards, P. W. Birkin, and M. S. Chambers.

Cheltenham Road Engineering Company, Mill Road, Aldington, Evesham, Worcs—£1,000. K. W. and H. W. Portman and T. F. Johnson.

A. E. Wheat & Son, Hillside, Aston Lane, Hope, near Sheffield—Engineers, etc. £2,000. F. E. and E. H. M. Capon and A. F. Weldon.

Pilmore-Bedford Refrigerator & Engineering Company, 104-6, Bromley Road, London, S.E.6—£5,000. D. J., E., W., and C. Pilmore-Bedford.

W. H. Podmore—Mechanical engineers, etc. £5,000. W. H. and E. E. Podmore, "Willow Hollow," Castlecroft Lane, Wightwick, Compton, Staffs.

British Alpha Diesel Company, 33, St. James' Street, London, S.W.1—Manufacturers of Diesel engines, etc. £100,000. S. Andersen and K. Edwards.

John Priestly, 164, High Street, Deritend, Birmingham, 12—Manufacturers of electrical plant and apparatus, etc. £2,000. J. and G. Priestly.

Scales Service Company, 37, Brown Street, Manchester, 2—Manufacturers of scales and weights, etc. £5,000. L. J. Males, S. Green, and J. Kay.

Steelwork Constructors (1946), Queens Chambers, 214, High Street, West Bromwich—£2,000. E. W. Werrett, G. S. Cheshire, F. and W. Handley.

Rumere, Merrywood, Weston Green, Thames Ditton—Metal workers. General engineers, etc. £5,000. B. J. Rushmere and W. F. C. Davies.

Arplex, 96-100, Markhouse Road, Walthamstow, London, E.17—Manufacturers of engineering products, etc. £5,000. R. Etherton and H. A. Corsham.

Bagguley's Manufacturing Engineers—Manufacturers of metal implements, etc. £5,000. F. Hancock, Knutton House, Knutton, Staffs, and W. Hancock.

Dialoy, Plymouth Works, Dumballs Road, Cardiff—Die and sand casters, patternmakers, etc. £20,000. D. L. Davies, I. Maddox, H. H. and W. Williams.

W. J. F. Burgess, 101, Finsbury Pavement, London, E.C.2—Engineering supplies agent. £2,500. W. J. F. and L. M. Burgess, R. D. S. Terrell, and E. J. Rand.

CONTRACTS OPEN

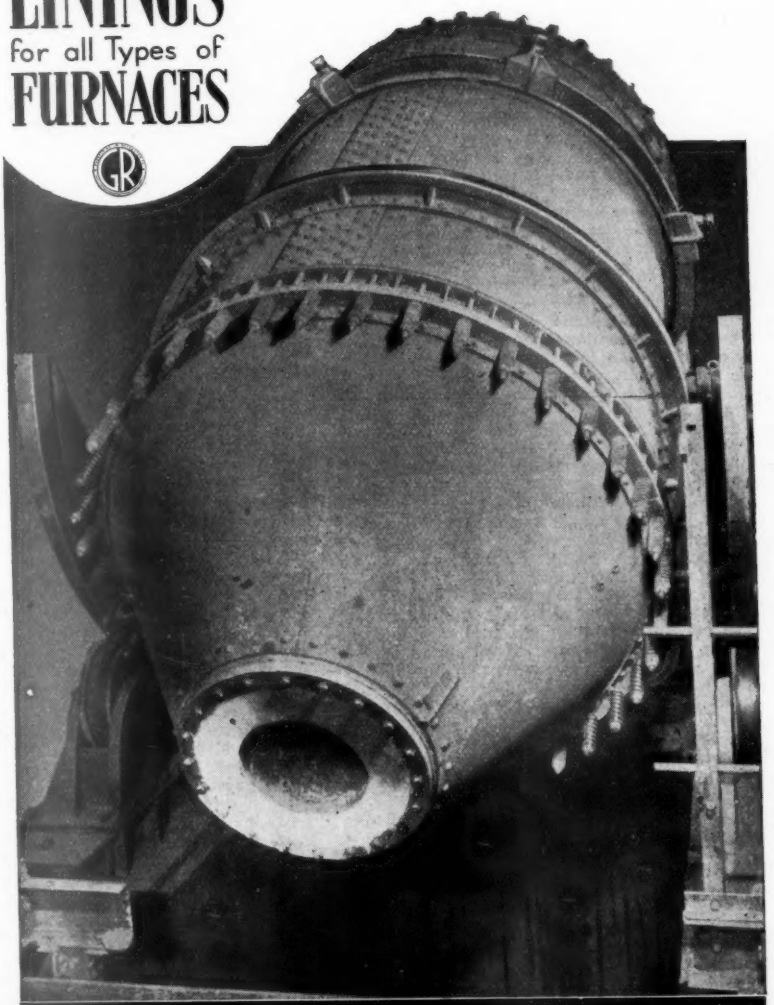
Any date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Bideford, December 16—Supply and erection of a complete and fully automatic domestic water boosting equipment, in duplicate, including all the necessary cast-iron pipes and specials, and accessories complete, for the Town Council. The Borough Surveyor, Town Hall, Bideford. (Fee £2 2s., returnable.)

Narberth, December 12—Construction of intake works, storage reservoir, pumping station, with duplicate set of pumping plant (electricity and Diesel), installation of chlorination plant, together with the provision and laying of approx. 3½ mls. of 8-in. spun-iron rising main, for the Rural District Council. J. Owen Parry & Lewis, consulting engineers, Ammanford. (Fee £5 5s., returnable.)

Rowley Regis, December 17—Construction of 181 yds. of 9-in. dia. foul sewer, 31 yds. of 24-in. dia., 39 yds. of 36-in. dia., and 253 yds. of 42-in. dia. storm-water sewers, for the Borough Council. The Borough Engineer and Surveyor, Municipal Buildings, Old Hill, Staffs. (Fee £2 2s., returnable.)

LININGS
for all Types of
FURNACES



General Refractories Ltd
Head Office: Genefax House, Sheffield, 10. Telephone: 31113 (6 lines)
FIREBRICKS · BASIC BRICKS · ACID-RESISTING MATERIALS · PLASTICS · INSULATION · SILICA BRICKS · SILLIMANITE · SANDS · CEMENTS

Raw Material Markets

IRON AND STEEL

It is satisfactory to report that pig-iron production is improving. There will shortly be increased demands from the light foundries when further labour becomes available. At present they are not up to peak production owing to the shortage of skilled workers. There is an insatiable demand for all forms of light castings, particularly for the building industry. The Control is keeping a careful watch on the distribution of supplies of high-phosphorus pig-iron. Reserves are rather low at the furnaces and at the foundries, and any substantial additional demand would be difficult to meet. The general engineering, speciality and jobbing foundries are also busy and are now requiring large supplies of low- and medium-phosphorus iron, hematite and refined iron. There is a big demand for cast-iron and steel scrap, and while the supplies are reasonably good, larger tonnages of light and medium cast-iron scrap would be welcome. The foundries have no difficulty in securing their requirements in ferro-alloys and, apart from delays due to railway embargoes and shortage of wagons, supplies of limestone, ganister, etc., are coming through reasonably well. Wagon shortage and congestion on the railways are having some effect on the transit of pig-iron and coke.

Supplies of billets, both square and flat, do not show any sign of improvement. Fortunately, home production has expanded, otherwise the re-rollers would have been in a sorry plight, imported supplies having been meagre for some time. The re-rollers have plenty of work on hand for small sections, the usual run of strip, casements, sizes, etc., but they are not able to achieve maximum production in the majority of cases. Sheet bars are coming forward fairly satisfactorily. Sheet makers have many months' work on hand.

Heavy pressure is still being exerted for joists, structural materials, etc. The shipyards and boiler and tank manufacturers are fully employed and their requirements in plates are considerable. Without any additions to existing commitments, present demands will keep the mills fully occupied for a considerable part of next year. The rail makers, too, are committed well ahead, while active conditions continue to rule at the wire plants. Considerable quantities of steel strip, black and cold-rolled, are necessary for urgent work in the home market.

NON-FERROUS METALS

Commenting on the probable future supply position of copper at the annual meeting of the Council of the Copper Development Association last week, Lt.-Col. R. M. Preston, the chairman, said the present difficult supply position was likely to last for a considerable time. The production developments in Northern Rhodesia were some distance ahead of us and, although in the meantime every ton of copper was going straight into production, the total was insufficient to meet present requirements. Stocks in all countries had fallen and scrap was being absorbed without any apparent influence on the market. This strong demand for copper would last for two years or so until the backlog of work that could not be undertaken during the war was completed, but he believed that, far from there being any falling off in the demand for copper when deferred work had been completed, the curve of consumption of copper was likely to continue steadily upward.

Col. Preston said that electrical developments were almost certain to require large and increasing tonnages. Copper had now been accepted as a standard building material and was expected to remain so. The high efficiency, low maintenance cost and resistance to corrosion of copper tubing placed it in a satisfactory competitive position compared with the other metals used for this purpose, and the same characteristics added to cheaper first cost applied to rolled metal for damp-proof courses, flashings, weatherings and the like.

The extended use of copper in the building trade was a relatively new growth, he said. Although the tonnage at present involved was not very large, it was likely to be one of our most promising lines in the future. The shipbuilding industry was also a large and increasing consumer of copper. Lastly, we had the motor-car industry, hampered at present by the shortage of steel, but gradually getting into its stride, and certain to require greater quantities of copper than ever before.

A leading article in the October issue of "Tin and Its Uses," published by the Tin Research Institute, of Fraser Road, Greenford, Middlesex, critically examines the question "Is Tin Still Scarce?" It is concluded that world tin consumption will exceed current production by only a few thousand tons in the next two years, and that world stocks are now at least 100,000 tons in excess of pre-war levels. The long-term prospects for tin-ore supplies are shown to be "as well assured as are those of any other mineral."

Webcoline!
"The LEADER of ROTARY FURNACE Refractory Linings."
WRITE FOR PRICE AND FULL PARTICULARS
WEBSTER & CO. (Sheffield) Ltd., Millhouses, Sheffield, 8.
Telephone: Sheffield 71074.
MAKERS OF HIGH GRADE REFRACTORIES